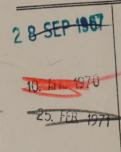


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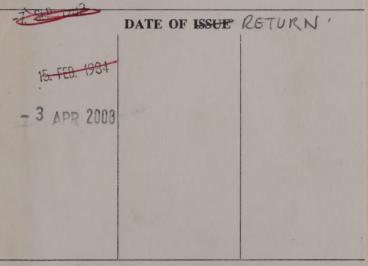
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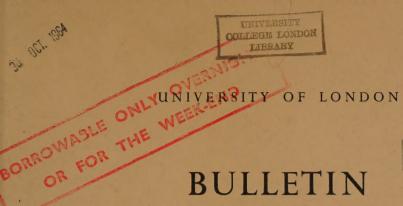


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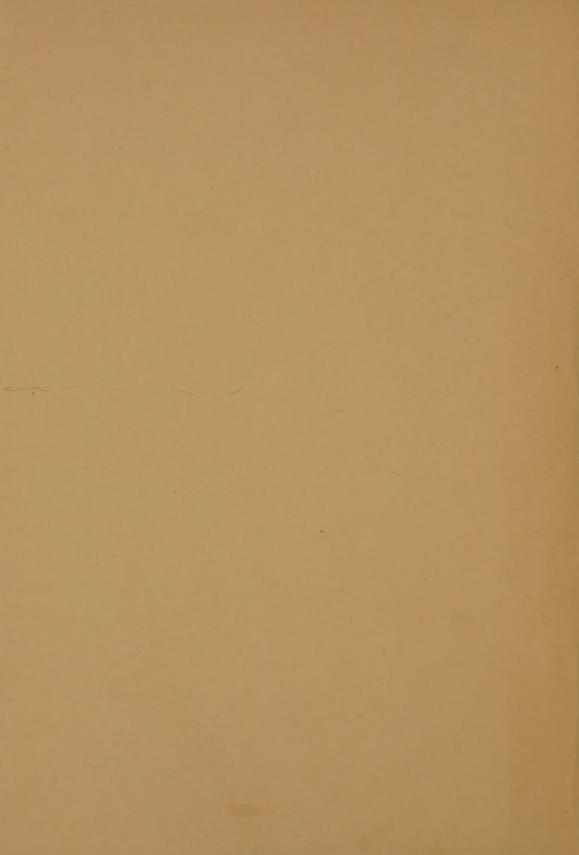
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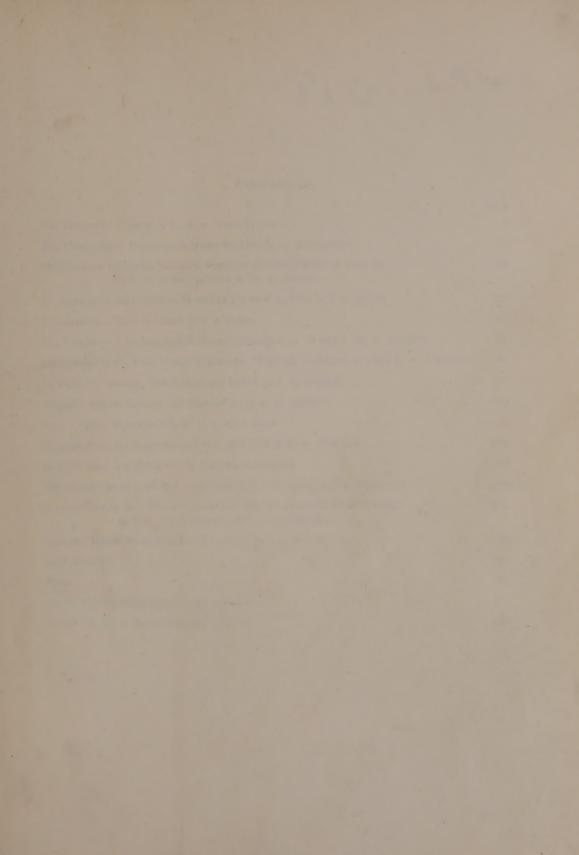
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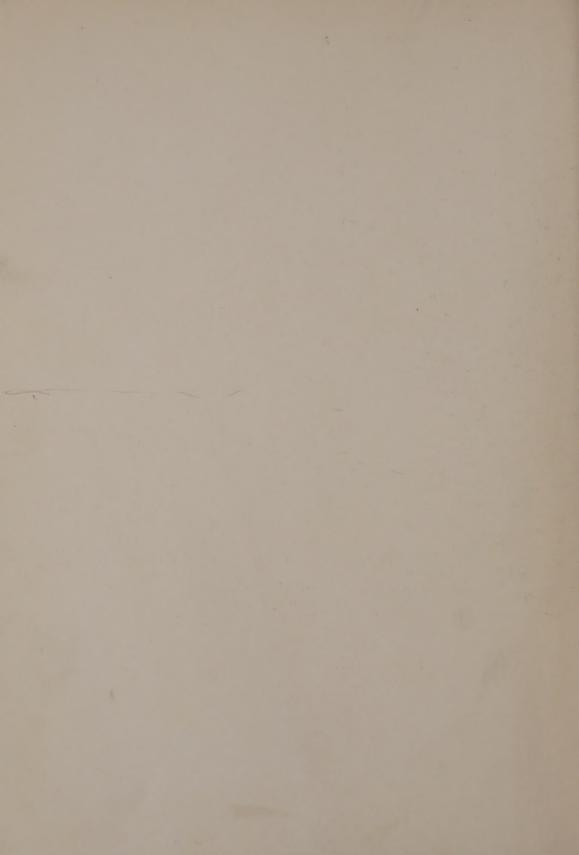
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The Origins of Coinage*

by K. de B. Codrington

It is still necessary to make a plea for the urgent need of Chronology in all branches of Indian studies, for dates are the foundations and framework of history. The inscriptions dated in the great eras on which dynastic history rests provide us with a firm basis. We know exactly where we are and have the advantage of what may be described as Prime Chronology. But where this is not so, we must make use of other Secondary Chronologies, based not upon the calendar but upon evidence of a circumstantial nature. There is, to begin with, the archaeologist's superposition of stratified sites, familiar in principle to geologists who use it critically and find the idea of contemporary fascies useful. There is, also, the Chronology provided by the sequence dating of cognate objects, using the corpus as its tool. But there is yet a third Chronology available to us—the Chronology of Technology, of the use of raw materials and the development of processes, which, of course, lie behind the corpus and everything that goes to make what archaeologists and anthropologists rather light-heartedly call 'material culture.' I will bring this to earth by a generalisation which is fundamental to my subject. Setting on one side the idea that man discovered metals by lighting a bonfire on a copper-mine, it is, I suggest, a fact that the production of metals in bulk (we need not go beyond copper, tin and silver to begin with) depends upon the availability of charcoal. Now charcoal is not easily made, for brushwood is no good, nor is timber which, given the saw and adze in addition to the axe, has other uses. In a temperate climate charcoal is made from the leg-wood, the medium-sized branches of timber or from medium-sized coppice-wood, though the latter is the product of a developed forest-conservancy technique and is not produced by any form of primitive shifting cultivation. The ancient forest laws of this country protected vert as well as venison, and it is well that they did so or there would not have been a forest left in the land, for the tanners lived on bark, just as the metal-trades lived on charcoal. At a low estimate the charcoal needed to smelt iron amounts to about thirty times the weight of the ore brought to the furnace. Egypt, a thickly populated, highly cultivated river valley, had acacia, sycamore, tamarisk and willow, all necessarily in small supply. She imported for joinery purposes beech, box, lime, cedar, cypress, fir and pine. Therefore, against the enormous quantities of metals she accumulated in her treasuries through the centuries, must be set an obvious *Based upon a public lecture given at the Institute on 2nd May, 1961.

deficiency of charcoal, without which the metallurgical technologist cannot work. Egypt did not invent coinage, nor did she find a need for her own coinage until after Alexander.

But we must begin by asking: What is a coin? George Hill in his illuminating Encyclopaedia Britannica article begins at the beginning with the dictionary readings of Nomos-Nomizein, Pecus-Pecunia, which distinguish between money in the purse and wealth on the hoof. Summarising his long experience as an archaeologist, he drily comments that though coin-finds often confirm history, they seldom correct it. Indeed, numismatics, which is the study of coins and medals, is not solely concerned with chronology. It is largely, like the history of art, a collector's pre-occupation and every cabinet reflects the vagaries of taste and sale-room prices, Hill, following Aristotle, defines a coin as a 'piece of metal of a fixed weight, stamped by the authority of a government for circulation.' To which definition, admirable as it is, he might have added that coins must be conveniently portable, in purse and pocket, or tied up in the shirt-tail. Medals are commemorative pieces, not intended for circulation, and this was the Renaissance view, though their scholars held up the Imperial types of Augustus as emblems of real glory to the princelings it was their lot to serve, thus setting the commercial issue above the commemorative collector's piece. The existence of the two examples of the Alexander-Porus medal, provides India with her only clearly commemorative piece, and it is fitting that two modern, really admirable versions of these should recently have been put into circulation, to be betrayed by that inattention to detail which even skilful forgers seldom avoid. However, the difference between a coin and a medal is less than Hill allows, for the commemorative medal would not have come into being had not the royal portrait found a place in coinage proper. Some mention, too, must be made of coins with commemorative devices or superscriptions.

But we are concerned with the part India played in the institution of coinage and with its origins, and, therefore, the possibility of the independent invention of coinage in various places and times must be given some consideration. Here the comparative method is available in reviewing the devices and superscriptions of various groups of coins. The honorific titles given to the issuing king often have a history of their own. King of Kings, Son of Heaven, Satrap and Saviour speak for themselves. But it is the weights of coins that provide the most satisfactory evidence, for if the issue is to be commercially acceptable it must be based on a known standard of weight, for only then can the purity of the metal, its value as a commodity in trade, be recognised. The dating of coins, therefore, must satisfy the known history of weights and measures.

Both inscriptions and excavation make it plain that there was no dearth of

the precious metals from early times, but in reviewing all this information it is necessary to keep well in mind the technological accomplishment, skill or science or whatever you like to call it, that makes the things we are studying possible. As has been said, the stamp on a coin guarantees two things; the purity of the metal and its weight. Therefore, to the metallurgist's skill must be added the ability to weigh, and it should be evident that the accuracy of a weight is the accuracy of the machine that brings it into being, either balance or steel-yard. Enormous quantities of the precious metals were brought to Egypt during the years of her foreign conquests before the end of the Theban empire, and it is known that goods were paid for in weights of gold, silver and copper, though the jewellery and vessels and plated furniture and chariots of the tomb-treasures must have consumed much of the available precious metals. Wealth was, also, methodically stored. The treasury scenes portrayed at Medinet-Habu show that gold was stored in the form of ingots, rings, vases and gold dust, and here we touch upon the very origins of all this treasure. For gold is native and is to be had by washing, panning, the alluvial deposits of certain rivers in which it occurs as dust or small nuggets. It is, also, to be won from the rock which, however, has to be first crushed under the pestle, the gold being afterwards washed from the crushed quartz exactly as it is from the alluvium of rivers. Both processes require ample supplies of water. In the Egyptian treasuries the gold of the spoils of war and the tribute gold from the Asiatic countries must have been usually processed and cast into ingots and rings before transport, but the gold-dust was brought in from the mines or washings as it was won, sometimes from great distances, for Egypt, like Mesopotamia and the lower Indus Valley, was ill provided with sources of ores. In the XVIIIth Dynasty, gold, as well as incense-trees, was obtained from Punt. The mines of Sinai had been worked since the XIIth Dynasty and there were, also, the Red Sea mines. Yet under Queen Hatshepsut and the great Seti, and again under Rameses II, the production at Sinai failed. Again under both Seti and Rameses II the same story of failure is told with regard to the mines of Atika, which is Gebel Ataka. The workmen and the work were dependent upon the water supply and, since there is no evidence that the rainfall fluctuated, it must have been the cisterns, the storage system, which broke down.

However, in spite of all this, the Tel-el-Amarna letters make it plain that throughout the Asiatic countries Egypt was regarded as a source of unlimited gold supplies. 'For was not gold as the dust of the country?' as Dushratti of Mitanni wrote to his son-in-law, Amenhotep IV, Akhenaton. Indeed, there was at that time a shortage of gold in Babylon, in spite of the fact that Babylonian jewellery and metal-work were much appreciated in Egypt. In reply to a hint that Babylonian jewellery would be welcome at the Pharaoh's court, Burnaburias, the king,

demands ingots of gold from Egypt to be worked up into ornaments, vessels and plated chariots, and shipped back as finished goods. It is clear that this constant demand for gold for purposes of ostentation caused fluctuations in the available supply, which must have reacted upon the value of silver.

Unfortunately we have less information about silver than about gold. Although it would not be true to say that silver does not occur naturally like gold, it seems there is no authority for suggesting that it was washed from rivers or from crushed quartz, as gold was in the Old World. Technologically the two metals are distinct. The source of ancient silver was mainly, if not entirely, Galena, in which it occurs with lead. The ore has to be mined and the metal got from it in the furnace. Galena is unique among the ores used in antiquity, because it not only is heavy in weight but also looks like an ore. However, in the furnace it presents peculiar difficulties, one of which is the constant danger of lead poisoning. Copper and tin do not present this particular difficulty. The ancient copper ores, Azurite and Malachite, are a bright greenish blue, easily discernible in the rock. Tin ore, Cassiterite, is brownish-black in colour. It occurs as a vein-ore in granite or granitic rocks, and as these weather easily, it is also found in alluvial deposits. usually as pebbles in the downward denudation stream. These, because of their weight, collect together in banks or drifts from which the ore must be picked by hand. There is no connection between panning for alluvial gold and hand-picking stream-tin. It is probable that stream-tin was the only source of ancient tin.

In attempting to review the origins of the technology of ancient smelting, we are really only concerned with the oxides of copper and tin, for the sulphides require roasting before smelting. That is to say, the sulphur content has first to be oxidised before the ore is reduced. It is, however, plain that the sulphides were used in fairly early times and it must, therefore, be accepted that, where this is so, the double process requiring reversed conditions was understood. As against the complexity of this, the smelting of the oxides is simple. Indeed, a shallow bowl furnace will reduce the oxide and produce the metal if plentiful charcoal is used as a fuel. But copper reduced in an open-hearth fire in this way comes down as a spongy mass, something like bloom iron, and has to be purified under the hammer and in the crucible before it is good for much. Galena will give some silver under these conditions, but the lead fumes are lethal, and the lead is, of course, lost, The lead can only be saved by what it is best to call ancient cupellation, in order to avoid confusion with modern practice. Here the ore is laid on a bed of bone ash and the flame must be brought to bear on the top of the charge, which can only be done if a baffle is interposed between the hearth and the charge, and if a powerful chimney draft is maintained. Under these circumstances some of the impurities are removed in the ash, and the lead oxide is sublimated and may be scraped from

the cold flue, later to be reduced in the crucible with charcoal. Gowland states that lead came into use at the same time or a little later than silver. However, both are Pre-Dynastic. Galena is plentifully obtainable in the Red Sea hills, for instance at Gebel Rosas, which produced 18,000 tons of the ore between the years 1902 and 1915.

In stressing the specialised design of the furnace which lies behind the availability of lead in ancient times, it is as well to point out that the process is far less complicated than iron-smelting, in which a concentration of carbon monoxide must be maintained in the furnace during the whole reduction process and a forced draft used at the end of the process to achieve the sinter-point and bring down the bloom. This process is only the first stage of the manufacture of the famous Indian *Wootz* steel, which is still carried on by certain hill and forest tribes. It is, perhaps, the major anthropological fallacy to judge a technique by the alleged social primitiveness of the people who practice it.

The metallurgical skill available in early times is shown long before the days of coinage by the remarkable purity of the silver from Hissarlik II and, indeed, throughout Mycenaean times. Yet silver was rare in Egypt in spite of the supplies of Galena available comparatively near home. It becomes a little more common during the XVIIIth Dynasty, when it is possible that Asiatic supplies became available. Reisner points out that in the tomb of Queen Hetep-Heri gold abounded, but that silver was confined to twenty thinly plated anklets. He goes on to say that it must have been more valuable than gold. But this is an example of the common fallacy in economics, which seeks to introduce a system before it could possibly function. Bimetallism arises from the need for a day-to-day rate of exchange in terms of the relative value of pure gold and silver. It could only arise when both were in plentiful supply. Silver is still rare in the tomb of Tutankamun.

In the days of the Assyrian supremacy, the flow of gold seems to have been checked, for though Shalmaneser received ingots of gold, silver, lead and copper from a Phoenician embassy, his spoils from Sazabe included only three talents of gold, a hundred of silver and three hundred of copper and iron. The annual tribute of Hattina was only a talent of silver, and of Carchemish a mina of gold and a talent of silver. It was gold that took the Phoenicians to Malagu and silver to Abdera. Yet the silver mines of Asia were still productive when Ezekiel hymned the glories of Tyre and Tarsus 'who was her merchant'. On the one hand, the famous silver mines of Mount Laurium do not seem to have been opened up much before the fifth century, though Zenophon and Herodotus make a great deal of them. On the other hand, Galena is plentiful in Anatolia, Armenia, Georgia and Caucasia, and it is also found in Persia. It would seem probable, therefore, that the reduction of silver was an Asiatic technique, belonging to this area. Looking

further eastward, Galena only occurs in small quantities in India, in spite of the fact that silver was the dominant metal in India's plentiful and distinctive early coinage. The question must, therefore, be asked: When did supplies of silver become available to India in exchange for her abundant gold? That the circulation of silver should dominate that of gold is not extraordinary as ample records show.

In the 6th century B.C. in Babylon, silver is clearly the metal of account of everyday life; the plentiful documents cover loans and wages, as well as purchases. Since Babylon produced no metals herself, all had to be imported and it is fortunate that surviving records give us a glimpse of one Iddin-ahu, a metal merchant by trade. In the year 550 B.C. copper was imported in large quantities from Cyprus and sold at the rate of 3\frac{3}{4}\$ minas to the shekel of silver, by weight, of course. Here once again, silver is the standard and it is important to examine the reasons for this. There is, of course, no difficulty at all in working commercially in the weighed, uncoined metal. Oriental travellers will remember that bar-silver, cut up as necessary when small change was wanted (the Persians call it pul-i-siyah, black money, i.e. copper money), was the standard means of payment until recently in the Chinese sphere of influence which presses on the Indian border. The plain fact is that pure silver had been available from very early times. There was confidence in it. Whereas Lucas, on the basis of analyses of gold objects, comes to the conclusion that pure gold was not available until the Persian period.

But the history of coinage in the Mediterranean does not start with either silver or gold. It starts with electrum, the natural alloy of silver and gold, occurring as gold does both in riverine alluvium and the natural rock. It is won just as gold is, from the rivers by washing or from the rock by first pounding and then washing, techniques which survived in Japan until recently. The main adulterant in gold is. thus, silver. As the result of extensive analyses, Gowland gives the gold-silver percentage in placer (alluvial) gold as ranging from 62% to 90% and in vein gold from 56% to 93%. It is, therefore, generally admitted that a gold-silver alloy, an electrum, which contains much less than 60% of gold is artificial, that is to say, intentionally compounded from the pure metals. This means that the famous electrum Cyzicene staters which Gardner says consisted of only 46% gold, as well as the hectae from Phocaea and Mytilene, which Hammer says consisted of 40% gold, 52% silver and 8% copper, were artificial. These issues date from after 480 B.C. and ample inscriptions and literary references make it plain that even then, in spite of the fact that contemporary supplies of electrum were compounded, it was not regarded as a compound but as a special kind of precious metal. This was an old tradition, for in spite of the variability of the gold content of natural electrum, it was consistently valued at 1 to 10 of silver. But electrum can only have been compounded when the pure metals were available and Lucas' conclusion as to the late

date of the technique of gold-refining must stand. There are references to the refining of gold of the XXth and XXIst Dynasties (1200–945 B.C.), but the problems implicated are complex and require special study. They do not effect the issue, which is quite simple. It is this: in order to provide Darius with the pure gold without which his famous reform of the Imperial Persian currency would have been impossible, a process was needed which would separate pure gold from electrum, the natural silver-gold alloy.

Such a process existed, though our only ancient authority for the method used is the statement of Agatharcides, preserved by Diodorus. It was, however, known to Strabo and Pliny and, also, to Theophilus. Moreover, it survived, as many ancient industrial processes did, in Japan until recently. It is a chemical process, and it is practical. It takes time, but it works. The natural alloy was heated in a closed crucible with clay, salt and barley-chaff for five days over a straw fire, that is to say, over a deep ash fire providing a constant heat. Under these conditions the silver in the electrum is converted into silver chloride and the sodium of the sodium chloride into sodium carbonate, the gold remaining as a regulus at the bottom of the crucible. The clay is introduced in order to aid the removal of the silver chloride, which it is possible to resmelt and so save the silver content. However, this does not seem to have been done in ancient times, the silver being lost. One consequence of this was that the silver content of electrum remained unknown.

And here it is necessary to turn to Metrology, or rather to the weights we are faced by when studying examples of early coinage. The facts I quote throw further light upon the ancient dominance of silver in the commercial world and once more our attention is directed to India. It must be realised that the *shekels* and *minas* and *talents* of the early coins are no more than names of weights, the *shiqlu, mana* and *biltu* of the Old Babylonian system which are familiar in various forms in our museums. They originated in the Land of the Two Rivers, the Naharin of the Tel-el-Amarna letters. I am afraid that scholars have not seldom spoken of coins where, in terms of Hill's definition, there are no coins. Literary antiquarianism, which so easily turns a word into an artifact, is a dangerous hobby. Of the Shamash heads and the Ishtar heads and circles which are found as words in inscriptions, little is to be said. What matters is that at a certain time there was pure gold, as well as pure silver, and the one could be satisfactorily valued against the other. Later a bimetallic coinage came into being and Darius was able to reform it.

But what was the status of silver in Achaemenian times? Is it justifiable to assume that the establishment of good money ended the silver-by-weight methods of accounting of the old counting-houses? Fortunately there is plenty of evidence

for taxation was implicated and Darius was not called the Huckster for nothing. But he did not invent coinage; he only reformed it. There were coins before him and there continued to be provincial silver coins of city or satrapal origin, which persisted side by side with the Imperial gold and silver issues. These provincial silver coins were not received as taxation at their face value by the Persian treasury. They were melted down and a receipt was given for the pure metal as officially assayed. The evidence is precise. For instance, an Akkadian tablet from the treasury records gives the details of the procedure and the gains to the King in the year 503-502 B.C. In setting out this material, Olmstead assumes that all taxpayments were made in coin. It is clear that they were made in silver, but the records do not distinguish between payments in coin and payment by weight. Why should they? The result was the same to the King. What is clear is that the final account was not settled in coins, Darics and sigloi, nor in the customary weights minas and shekels. They were settled in karashin, an ancient Iranian weight to which it is necessary to return again and again when discussing the origin of India's coinage. These weights exist. They have been excavated and, therefore, may be accepted as archaeologically real. Moreover, the everyday use of the measure is fortunately expounded for us at length in the Elephantine papyri, which rank only second to the Tel-el-Amarna letters in human interest.

It will be remembered that Ezekiel threatened the apostate Jewish mercenaries who upheld Egypt from Migdol on the Syrian frontier to Seveneh, which is Syeneh on the First Cataract. These mercenaries, however, continued faithful in the service of the Great King, who encouraged them by sending them an Aramaic rescript of his great Behistun proclamation, a fact which does not seem to have been noticed by Indian historians when discussing Asoka Maurya's proclamations and edicts. That the Jewish mercenaries were faithful to Darius is not surprising, for had he not glorified 'the House of the Lord which is in Jerusalem'? And there is no doubt that as mercenaries they lived under Persian administration in this most distant outpost of the empire. The records cover all aspects of public and private life, and references to payments and weights and measures abound. As in Assyrian times, the standard of weight was the Royal Stone, but the units of account were Babylonian, that is to say, the mina was divided into 60 shekels. The shekel, however, was divided into 40 hallurin, the ancient Babylonian halluru, to which great attention must be paid for the term means a bean. It was a seedweight and weighed 3.236 grains (0.2104 grammes). Moreover, with this purely Babylonian system, here on the western marches, the Persian karash, which we know was the final unit of account in matters of taxation in metropolitan Persia, finds its place. Six karashin went to the mina, the karash being, therefore, the equivalent of 10 shekels, 84.17 grammes (1294.5 grains).

And here at the risk of anticlimax, it is advisable to consider the prime facts on which any study of Indian coinage must be based, facts which have sometimes been lost sight of in the voluminous literature of the subject. First: the punchmarked coins which it is agreed are the earliest Indian issues are in silver and copper, not in gold. Second: the system of weights used in India, set out at length in the Law Books, depends for the lighter units upon seed weights, including the māṣa which is a bean. Third: the one ancient Indian term which uncontestably means a coin is kārṣāpaṇa, the actual word, karṣa, also, existing in its own right. It is generally admitted that the term is not Sanskrit. Dr. Agrawala has said 'the word kārṣāpaṇa is unknown in the Samhita or Brahmana literature... and is peculiarly a term of classical Sanskrit coined in the Sutra period'. 'Classical' in Indian literary studies, of course, means later than earlier.



Indian Punch-marked coins. One of the original illustrations in Edward Thomas' 'Ancient Indian Weights' Numismata Orientalia, Vol. I (1878).

In Vol. I of *Numismata Orientalia* published in 1878 three papers appeared, the first by E. Thomas on Indian weights, the second by Rhys Davis on Singhalese weights and measures, and the third, a landmark in the history of numismatics, Barclay Head's great paper on the origins of coinage in Lydia and its spread to

Persia. The Indian texts set out with remarkable consistency the traditional system of weights which in its lower values is based on seed weights. The units given in Manu's Dharmasastra are (1) liksa, the poppy seed, (2) raia Sarsapa, the black mustard seed, (3) gaurasarsapa, the white mustard seed, (4) yava, the barley corn, (5) raktikā or guñja, the striking scarlet and black seed of Abrus precatorius and (6) māsa which is a bean. For reasons, which will be given, doubts arise as to the practical use of such small weights as poppy and mustard seeds. But the raktika or ratti and the masa survive in the modern system as practical weights. Indeed, Abrus precatorius is in very wide use as a weight, from the markets of the Arabian coast to West Africa, where it is probably a recent innovation; and, as we have seen, the Indian bean-weight, the masa, must be set beside the ancient Mesopotamiam bean-weight, the halluru. It is important to note that the Indian series of seed-weights is extended upwards by a second series which clearly consists of gold and silver coins, suvarnas and rūpva dharanas. These coin-weights are related to a higher value, the niska, the original Vedic meaning of the term being 'ornament'. Two other Sanskrit terms will have to be considered later because of their technological interest: kośa, which is usually translated 'purse', but is really only a bag, and pinda which among its many meanings has one bearing on metallurgy. That Manu's table is bimetallic is shown by the fact that he separates the silver masa of 2 rattis from the gold masa of 5 rattis, though an exchange value of silver into gold of $2\frac{1}{2}$ to 1, which this implies, is hardly likely. However, Manu's bimetallism must obviously be considered in the light of the fact that gold coins are almost unknown in India until the Kushan issues on the Roman standard make their appearance.

Thomas defends the practical use of all the Indian seed-weights. He writes, '... in an essentially poor country, infinitesimal atoms of gold, gold dust and silver ... entered largely into the dealings of a people just emerging from the primitive state of barter ... The untutored villager had only to arm himself with the produce of his own fields to check . . . the fraudulent goldsmith's tale of weight or the merciless discount of the money-changer on the wear and depreciation of currency'. Here, to the anthropological fallacy is added the radical technological fallacy, which neglects not only the true properties of materials but the tools and apparatus available. A weight cannot be more accurate than the machine it is weighed by. The difficulty of weighing small weights is obvious, while the variations from market to market of such large weights as the Persian kharwar and the Indian maund indicate the equal difficulties of weighing large quantities. It is only in the middle weights that some consistency can be expected.

Thomas and all who have followed him, armed with the modern balance, have assiduously first weighed the coins and then weighed the seeds. The weights of the

coins must be allowed to speak for themselves, but in view of the antiquity of the Mesopotamiam bean-weight some attention must also be paid to the seed-weights, which indeed prove to be interesting as will be seen.

It is generally agreed, and there is some archaeological evidence to show that India's punch-marked coins are her earliest issue of coins. Professor Altekar shall speak for the general consensus of opinion we are faced by. He writes: 'It is now admitted on all hands that the normal weight of the punch-marked coins is about 56 grains, and is connected with the Indian guñja or raktikã seed, Abrus precatorius, 32 of which, weighing about 56 grains, constitute the weight of the normal kārṣāpaṇa, or punch-marked coin'. There are, of course, punch-marked coins of other weights and once the true basis of the Indian system is known they should fall into place. But for the moment we must pursue Dr. Altekar's 'normal kārsāpana' of 56 grains. Panini indicates that the kārsāpana was subdivided by regular halving into a half, a quarter, an eighth and so on, and it has been assumed that he, like Dr. Altekar, was talking of the kārsāpana of 56 grains, This Indian system of halves differs from the use of the \frac{1}{3} known in Lydia and Ionia from very early times. But in looking for any of these measures we must have some guide as to the probable accuracy of minting in ancient times and the facts that emerge are deeply interesting on this point. Turning to the smaller seed-weights, we find, as might be expected, a certain inconsistency in weight and nothing that tallies with the subdivisions of our kārsāpana of 56 grains. Even Abrus precatorius, in spite of Professor Altekar's assurance, is not wholly satisfactory as representing the ratti. Turning to the masa, Thomas zealously tried and rejected various available Faba. Lablab and Phaseolus species without success. But in Phaseolus vulgaris(?) which now is grown only in south India, he found what he was looking for. When weighed it provides the average weight of 3.625 grains (.2356 grammes) which we can set beside 3.5 grains (.2275 grammes) being the one sixteenth of our normal kārsāpana of 56 grains (3.64 grammes) arrived at by weighing the actual coins. Calculated from the seed-weight masa, the karsapana should be 58 grains, a measure which proves interesting.

It is only too apparent that both in Mesopotamia and India, scholars have been inclined to see coins where there is no clear evidence of coinage in Hill's sense. However, the accepted Indian term $k\tilde{a}rs\tilde{a}pana$ is capable of some elucidation. It is not Sanskrit, though $\tilde{a}pana$ is given in dictionaries as meaning shop or barter, and pana does come to mean a coin. On the other hand, $\tilde{a}pana$ in $k\tilde{a}rs\tilde{a}pana$ may only be an active suffix $(\tilde{a}pnoti)$ indicating doing something or acquiring something. The old Persian dictionary has for karash simply 'weight or unit of weight' and inscriptions on surviving weights support this. Is there anything in our sources

to show that this simple meaning was preserved in India and was only later expanded to mean coin, as with shiglu-shekel-siglos? Manu gives the equivalent of the copper kārsāpana as 80 rattis. But turning to the always important Arthaśāstra. we find that the gold suvarna was equivalent to one karsa of 80 rattis. If these two sources may be brought together, it is clear that here the karsa is a weight and value does not intrude. If the *ratti* is the same *ratti* as in our normal *kārsāpana* of 56 grains, the weight of the karsa was 140 grains. Furthermore, Panini (V.1.29) mentions kãrsãpana in a highly significant way, which those who comment on the passage have not perhaps always appreciated. The text is adhyārdha-kārsāpanam, dvi-kārsāpanam, which Dr. Agrawala translates: 'purchased for 1½ or 2 kārsāpanas'. Although it must be admitted that Zenophon speaks of 1½ Darics though no half-Darics were in circulation, you certainly cannot have one and a half coins in Hill's sense. However, if the term karash-karsa, when it was imported into India, simply meant 'a weight', it is clear that it did not tally with the weight of our normal kārsāpana of 56 grains nor with the Arthaśāstra's karsa of 140 grains. The karash, as an official Persian measure, was the equivalent of 10 shekels or the sixth of a mina, and weighed approximately 84.17 grammes or 1294.5 grains, that is to say, ten times the weight of the Daric on the scales. It seems likely that the Persian term karash-karsa intruded into India during the existence of the Achaemenian Indian province, Hindush, for it was an official weight used for taxation purposes as we have seen. It was, indeed, probably the measure used by Darius' treasury-officials to weigh the gold-dust in which the terrific tribute of Hindush was paid. Yet Olmstead, dealing with the Elephantine records, in his index enters karash under both 'weight' and 'money'. Under 'money', he only gives two entries, one of which merely refers to 100 karashin of silver, which is equivocal. However, if the karash existed, it weighed ten times the gold Daric and no such coins are known.

With regard to the origins of coinage in Hill's sense, only two points of view are possible on the evidence before us. It is true either that coins were independently invented in the Mediterranean area and in India, or that they came into being in Lydia and spread first to Persia and then to India sometime after the Indian province of the Achaemenian empire came into being. The date of this important event is now precisely known, for *Hindush* is included among the tribute-paying provinces in the trilingual inscription of the year 513 B.C. which is to be read on one of the pillars on the south face of the great circuit wall of Persepolis, the completion of which it celebrates. Ionia, the land of the Yavanas of the Indian sources, is also included. As Olmstead says, the conquest of the West had begun. And so, of course, had the Indian tribute of 360 talents of gold-dust. With regard to this, Strabo thought it worth while to preserve Megasthenes'

statement that Indian gold was sold in its natural state because it did not require to be purified.

It is not necessary to go into the gold sources of India, though the surface reef-workings in the Deccan may quite well be earlier than is usually allowed. Persia got her Indian gold as gold dust. It has been pointed out that the Vedic form of wealth, the kośa, is really a bag. Such little bags containing gold dust, known in the Bhutya Mahals as phetangs, were current as against rupees until quite recently. Nor need one go into ant-gold though this is not merely a western myth: paipilika occurs in the Mahabharata. But against the payment of tribute in gold dust and the circulation of weighed amounts of gold dust in bags, it is a fact, though a negative one, that no Daric has ever been found in India. It was Hackin's experience, as it is mine, that they must be exceedingly rare in Afghanistan. Yet in Afghanistan in the Chaman-i-Hazuri hoard there are 30 pre-Alexander Greek and 34 Athenian barbarous imitations, as well as punch-marked coins universally admitted to be of the Indian series, all of them silver coins. If this hoard is accepted as dating before Alexander, it proves that a silver coinage was then in circulation, in which Indian punch-marked coins played their part, side by side with Greek coins. How was the exchange value between these two currencies arrived at? What relation did they bear to Darius' reformed currency and to the gold Daric?

Head begins his survey of the origin of coinage in Lydia by using his knowledge of the Assyrian and Babylonian weights brought from Nineveh by Layard. These are mainly in the form of lions and ducks in stone and bronze, and many of them bear a double legend in Cuneiform and Aramaic, generally giving the name of the king and the weight guaranteed in minas. From early times the mina had existed in a double form, the Heavy Mina being twice the weight of the Light Mina. Through the years the Light Mina gradually fell from 520 grammes, but Brandis was able to fix its value for our period at about 505 grammes (7766.9 grains) and this value has been accepted by Thureau Dangin and, more recently, by Singer; it is the approximate measure on which the earliest known coins are based. The Babylonian system was hexagesimal, the talent consisting of 60 minas and the mina of 60 shekels. The shekel, therefore, weighed approximately 8.417 grammes (129.45 grains), and this is the weight of the Daric of the reformed Imperial Persian currency.

The double weight *Heavy Mina*, according to Head, seems to have passed directly to the Phoenician coast and so to other centres overseas, though strangely enough Tyre and Sidon issued no coins of their own until the middle of the 5th century. The *Light Mina*, certainly made its way from the Euphrates to Lydia, where Sardes, the capital, had long-standing links with Babylon. When advances

in metallurgy made pure gold available, as well as pure silver, it was possible and, indeed, necessary to set up an agreed gold-silver ratio, for a bimetallic exchange or coinage could not be maintained without it. Herodotus puts this ratio at 1 to 13, but Mommsen, relying on Zenophon's statement that 20 sigloi went to the Daric, the weights of these coins being known, was able to correct this to 1 to 13\. However, this ratio does not necessarily apply before the Persian reforms. The position is further complicated by the fact that the earliest coins were neither of silver nor of gold, but of electrum, the natural alloy of gold and silver, which varies widely in the proportions of the two metals it contains. Moreover, as has been pointed out, electrum continued in use for some time as an artificial alloy of low gold content. Head puts the electrum-silver exchange value at 1 to 10, but since electrum was accepted as a precious metal in its own right, this value was arbitrary. However complicated the issue of coinage in an arbitrarily valued allow may seem, two facts are inescapable: first, the earliest coins and the proto-coins with which they are linked by their weights, are of electrum, and second, the measures on which these coins and proto-coins are issued are derived from the shekel of the old Light Mina, which, when pure gold was available, became the Persian Daric and was established by Darius. The value of this weight of gold in silver at 1 to 13½ provided a weight of about 1726 grains, which is the basis of the early electrum coins and the Asiatic-Greek silver issues which succeeded them, as well as of the Persian silver issues. This silver equivalent of the gold shekel is actually a variable, dependent upon the current weight of the shekel and the gold-silver ratio. It cannot be regarded as a constant or as universally applicable, and its variations may represent geographical and/or chronological distinctions. The British Museum Catalogue (1932) speaks of 'the simple but none the less remarkable Lydian invention' of coinage, and goes on to point out that the earliest European silver coins were issued in the island of Aegina on the Aeginetic (Pheidonian) standard which had nothing to do with the old Asiatic measures. The Asiatic coin measures were, therefore, in competition with a foreign system from early times.

Herodotus and Zenophon are our chief sources for the origin of coinage, but the general pattern of the historical background is well enough set out. When the Assyrian Empire decayed, Lydia followed Media's example and threw off the yoke, and so began a new chapter of national life under the Mermnadae. Inheriting much from the Carians, she looked seaward and westward, and easily gained a footing on the Hellespont. Indeed, she very well might have come to dominate all the coastal cities had not the Cimmerian invasion taken place. Her prosperity is witnessed by the gold and silver vessels Gyges gave to the Delphic shrine, wealth unparalleled in the eyes of his contemporaries. Lydia produced electrum.

Its source was the river-washings of Pactolus. Behind the early stamped electrum coins, which are coins in Hill's sense, are the unstamped but accurately weighed dumps made by the same technique as the coin blanks. As has been said, the weights of these electrum dumps and the earliest coins which followed them are derived from the old Light Mina. As excavation reports come in, the traditional dating followed by Head will have to be modified, but it will serve to indicate the marked technological development displayed by the series. The story goes that Croesus came to power in 568 B.C., dominated the coast and issued the first diestruck coins, the fine dies showing that the skill of the Greek seal-cutters with their delicate lap-wheels had been enlisted. His coins are coins as the world has come to know them. But the earlier coins, lying behind the group Head gives to Croesus, are not die-struck, that is to say, struck from a single die bearing a single device. Head describes them as 'punch-marked' using the term invented by Prinsep to describe the coins he identified as the first Indian issue. On them deep incuse squares and oblongs are struck by separate punches. This technique is not as simple as it sounds, for the problem remains as to what sort of anyil these coins were struck on and how the striking was actually done. But there can be no confusion between these punch-marked coins and the die-struck coins which immediately followed them. The types are set out in Head's excellent plates, but it is not necessary here to attempt any further precision in dating. These punchmarked coins and Head's Croesus group antedate the issues of the Great Persian King and the organisation of *Hindush*, the Achaemenian Indian province. Moreover, there is a close connection between the earliest groups and the Imperial Persian issues. It was left to the Great King to put on his coins the royal figure. the king with bow, which gave these coins the name of 'archers'. The origin of the portrait head must be sought elsewhere at a later date. The obverse of these early Darics bears the die-struck royal figure, but the reverse is of two kinds. It may be occupied by the old square or oblong incuse punch-mark, either plain or figured, or it may bear a striking wavy device which varies from coin to coin.

As against the earliest known coins, Head's Croesus group stands out for its workmanship. The devices on the obverse suggest heraldry: head of a lion; lion head on a shield; foreparts of a lion and bull, and so on. However, here again the reverse is punch-marked, some of the punches bearing geometrical devices which deserve to be carefully examined by Indian numismatists. But the earliest and most interesting group is punch-marked only on one side, the obverse bearing a striated device, the *typus fasciatus* of the catalogues. These coins, which are oval, are said to have been made by dropping the molten metal into water, or more probably oil. The striations seem to be cast and it is suggested that the metal was poured on to some kind of mat placed in the water or oil. There are tech-

nological difficulties in this, but they are nothing to the fundamental difficulty of achieving the correct weight by any such methods. It is possible that the early striated backs are connected with the Achaemenian wavy-backs, and that both were derived from file marks, the traces of weight regulation by filing, a simple matter. However, the coins as we have them are not filed, and examination shows that their weights are to standard.

But this is not the beginning of the story. Head's Croesus and pre-Croesus groups may be accepted as coins in Hill's sense. But unstamped pellets of electrum are also found, the so-called 'dumps' of the catalogues. Evans also found two silver dumps at Knossos and dated them 9th century. There is no doubt that the weights of certain of these dumps are calculated and that they represent real value. Indeed, as will be seen, the accuracy of their weights is quite astonishing. It may be suggested that these cast dumps correspond with the *pindas* which are frequently mentioned in the Vedas as a form of wealth. Indeed, if later literary references are accepted as cogent, it is clear that the word *pinda* among its many meanings has one that is associated with metal. The common example in logic that there cannot be smoke without fire, but that there can be fire without smoke, is illustrated by the *pinda* of glowing metal that is extracted from the furnace during the process of smelting.

It is now necessary to bring all these facts to the test of the actual measures employed. Only part of the complex details concern us in our search for Chronology. Following the original figures of Head and Cunningham, the weights will be given in grains, though it is urgent that Indian numismatists should adopt the metric system. As has been said, the weights of the early electrum coins are derived from the old *Light Mina* and so are the weights of the dumps.

 $129.45 \times 13\frac{1}{3}$ (the weight of the gold *shekel* multiplied by its relative value in silver) = 1726 grains of silver which, if divided by 20 gives the Persian *siglos* = 86.3 grains. Divided by 10 it also gives 172.6 grains. But since *sigloi* exist, it is better to take the average weight of Head's early coins, 84.37 grains, which makes the value of the *Daric* in silver 1687.4 grains. A tenth of this is 168.74 grains and a silver stater of this weight divided into halves, thirds and quarters, produces coins of 84.37 grains, 56.25 grains (3.640 grammes) and 42.18 grains.

Here then is the Indian measure of approximately 56 grains (3.628 grammes), the Perso-Indian normal *kãrṣãpaṇa*, which all authorities agree, however devious their arguments, to be the basic unit of the Indian punch-marked coinage, and it is tied to the known weight of the Persian *siglos*. Moreover, this fundamental unit can be carried back to the electrum dumps, which lie at the very beginning of the technological development of coinage. The best preserved dump in the British Museum weighs 56.2 grains (3.641 grammes), while one of Evan's dumps,

excavated at Knossos, which is quoted by Gardner without comment, weighs 56.4 grains (3.654 grammes). That the stater, the controlling weight, was approximately 168 grains is indicated by the fact that the coin which stands at the head of the British Museum Catalogue, IA No. 1 as the earliest known coin, weighs 166.8 grains (10.81 grammes), its third being 55.6 grains.

Finally, remembering the great extent of the Achaemenian Empire, stretching from the First Cataract, from Elephantine, to *Hindush*, to the Indus, it is interesting to work out the exchange value of the gold *Daric*, which dominated the coinage of the provinces. At a gold:silver value of 1:13\frac{1}{3}\$ the Asiatic *siglos* should weigh 86.3 grains. The Asiatic-Greek \frac{1}{3}\$ of the stater weighing about 56 grains went 30 to the *Daric*, and so must have done the Indian silver *kārṣāpaṇa*, which by the test of weighing the coins is considered to weigh about 56 grains. It will be seen that calculation shows that the Asiatic-Greek \frac{1}{3}\$ of a stater should have weighed 1726 divided by 30 = 57.52 grains (3.746 grammes). You will remember that Thomas by weighing his beans arrived at a *māṣa* of 3.625 grains, making a *kārṣāpaṇa* of 57.6 grains. This is 0.08 grain above the theoretical value derived from the *Daric* of 129.6 grains. Moreover, Cunningham surveying the coins in his collection, eventually put the weight of the *kārṣāpaṇa* at 57.6 grains.

In all this long story we only twice touch Prime Chronology. We know that Hindush, the Indian province of the Achaemenian Empire was in existence in 513 B.C. and we are told that Alexander received tribute in coined silver when entering India, a statement which is borne out by the Chaman-i-hazuri hoard. It is clear that the Indian silver punch-marked kãrsãpana of approximately 56 grains (3.628 grammes) is equivalent to the Asiatic Greek silver \(\frac{1}{3}\), and that both were linked with the siglos and based upon the gold Daric, Technological Chronology cannot accept bimetallism before the availability of pure gold, but the measure of the Indian punch-marked coinage is equal to the Asiatic-Greek \(\frac{1}{3}\) of a stater and can be traced back to the electrum dumps. This measure cannot have originated before bimetallism, but it was current before the creation of true coins in Hill's sense. It would seem that the gold-dust of the Indian tribute was the main support of the Daric and it is likely that in exchange for this, and the trade that followed the Imperial tax-gatherers. India got her supplies of foreign silver which enabled her to coin her silver kārsāpanas. In any case the weight of these is clearly derived from a widely accepted value of the old Light Mina, a fact which in itself makes it unlikely that coinage was independently invented in India as well as in Lydia. As for the coming of bimetallism, it is universally agreed that gold and silver coins came into existence after the earliest electrum coins but before the time of Darius' reform. Technological Chronology seeks a precise date for the refining of gold. It is clear, however, that the Croesan gold and silver coins were an innovation

because of their systematic metrological organisation. They were also a metallurgical triumph for they are extremely pure. But they were based upon the silver equivalent of the *shekel* weight of gold as current in the markets of the day.

It may be shown that the measure of approximately 56 grains survives from the very beginning and may be traced in coinage long after the time of Darius. But in spite of Dr. Altekar's assurance, it is important to review the other measures in which the earliest coins were struck.

IA, No. 10 of the British Museum Catalogue, which is given to Phocaea, is an electrum coin weighing 255 grains. Nos. 18 and 19, also of electrum, weigh 252.6 and 252 grains respectively. This measure is known elsewhere in silver. Regarded as a stater of 256 grains, it would give fractions of a $\frac{1}{2} = 128$ grains and a $\frac{1}{3} = 85.33$ grains, but it is also $1\frac{1}{2}$ times the silver stater of approximately 170 grammes from which both the Indian $k\tilde{a}rs\tilde{a}pana$ and the Persian siglos are derived. At the conventional value of electrum to silver of 1 to 10, IA, No. 10 would, therefore, be worth exactly 30 silver units of 85.33 grains, the theoretical value of the siglos being 86.3 grains. The siglos is represented in the British Museum Catalogue by IIIA, No. 3, which weighs 82.4 grains and IIA, No. 2, which weighs 80.6 grains. An early silver coin given to Lampsacus (IA, No. 27) weighs 82 grains. An electrum stater of 256 grains worth 30 silver coins of 82 grains represents an electrum:silver rate of 1:9.6.

A further opportunity of comparing the electrum:gold:silver_values of these early coins is provided by IA, Nos. 3 and 20. IA, No. 3 is of electrum and is given to Parium; IA, No. 20 is of gold and is given to Sardes. Both weigh exactly 124 grains. Assuming that IA, No. 20 is equivalent to 30 silver units of 56.4 grains, the measure of Evans' silver dump, it will be seen that a gold-silver ratio is arrived at of 1 to 13.6, which is somewhat high. Assuming it is the equivalent of 20 silver coins similar to IA, No. 27, which weighs 82 grains, it will be seen that a gold:silver ratio of 1 to 13.2 is shown. With regard to IA, No. 3, which is of electrum, assuming this coin to be equal to 15 silver units of 82 grains (15×82=1230), it will be seen that an electrum:silver ratio of 1 to 9.8 is shown. Furthermore, this electrum coin of 124 grains is almost exactly half the weight of the famous electrum coins of Cyzicus which weighed about 247 grains. These then were worth 30 silver coins of 82 grains and demonstrate the same electrum:silver ratio of 1 to 9.8.

The British Museum Catalogue gives IA, No. 22 as an early *Daric*, weighing 127.7 grains. If the weight of the contemporary silver *siglos* is taken to be 82 grains, following IA, No. 27, this would give a gold:silver ratio of 1 to 12.8, which seems too low. The weights of the *Darics* given in the Catalogue (IIIA, Nos. 1–3) range from 126.6 to 128.4 grains, though the fine gold coins of Lampsacus which are listed as IIIA, Nos. 18–28, range from 128.5 to 130.7 grains. In any case, an

increase in the weight of the *Daric* is indicated. A *Daric* of 130 grains and a gold: silver ratio of 1 to 13½ would make the Asiatic stater 173.3 grains and its third 57.78 grains. A *Daric* of 127 grains at the same ratio would make a stater of 169.3 grains and its third 56.44 grains. It might be suggested, therefore, that the divisions of the Asiatic system are derived from the earlier and lighter values of the *Daric*.

But in spite of Altekar's acceptance of the consensus of opinion as to the normal kārsāpana of 56 grains, it is necessary to review the position critically. What is required is a detailed account of the measures represented by the mass of early Indian coins available to us, which must then be set beside the measures found elsewhere in the ancient world. But this is beyond the scope of this preliminary survey. However, certain principles must be borne in mind. If a coinage is widespread it must be assumed that there was confidence in it or, in other words, that the issuer's guarantee of the weight and purity of the metal was accepted. Coins in circulation lose weight by wear and they may be debased in real value by clipping or filing. On the other hand, nothing can increase the weight of a coin and the issue of overweight coins is obviously uneconomic. The mean weight of any one type, as it is displayed in catalogues, is, therefore, without significance and the collector's 'mint condition' must be accepted only when the maximum weights of the available coins have been reviewed. Where the fractions of the stater, the dominant coin, are known, they must, of course, be reviewed with the stater, and often provide important evidence. John Allan, in his British Museum Catalogue of the coins of Ancient India, does not analyse the coin-weights he registers. But he does provide us with a masterly analysis of the punch-marked devices found upon the coins and proves that the groups of devices are organised and, therefore, must represent the issuing authority or authorities. The system of signs used is not primitive, nor are the punches of the type found in the early Lydian coinage. Moreover, the extension of the Indian silver issues into a massive copper coinage is a distinctive factor.

Allan begins his Catalogue with a group of coins (Part I, Class I) which he assigns to the 'Persic' standard, accepting the remaining coins (Part II) as being essentially Indian. This is a little confusing for, though pellet-struck Indian coins may exist, the bulk of the Indian punch-marked coinage is struck on approximately rectangular blanks cut from ingots or from sheet metal, and is, therefore, quite unlike the Lydian and Persian issues. Inspection of almost any page of reproductions of these coins will show that many of them have been clipped across one or two adjacent corners. Indeed, clipping was only too easy when such blanks were used, as the variations in weights show. It is important to notice that, though these coins are often described as 'square', many are round. Allan's 'Persic' class, the bent bar coins which are known from Taxila in an unfortunately vague archaeo-

logical context, weigh very consistently about 177.3 grains. Treating this as the stater, it provides theoretically a \(\frac{1}{3}\) of 59.1 grains, a \(\frac{1}{3}\) of 44.35 grains and a twelfth of 14.8 grains. The ½ is represented by No. 10 which weighs 43.5 grains. These distinctive coins are usually associated with the North West. However, Allan's Part I, Class 5 consists of coins which weigh very consistently about 29.6 grains, which represents the sixth of a stater weighing 177.6 grains, Moreover, among Allan's Part I, Class 1, bent bar coins are five, all just below the maximum of 19.9 grains (No. 12). The \(\frac{1}{3}\) of the stater, the k\(\tilde{a}rs\)\(\tilde{a}pana\), is not found, but the sixth of the stater gives its value $2 \times 29.6 = 59.2$ grains. Of this *kārsāpana*, the 19.9 grain bent bar coins are $\frac{1}{2}$ s, making it $3 \times 19.9 = 59.7$ grains. Moreover, since this measure is shared between the North Western bent bar coinage and Allan's Part I, Class 5, which is considered to come from the Konkan, these measures giving a heavy kārṣāpaṇa of over 59 grains cannot have been confined to the Persian borders of the peninsula. Nor are these the only indications of the existence of a karsapana of over 59 grains. In Allan's Part II classification the same high values occur frequently, for example Part II, Class 1, group 1, No. 48, 58 grains; Class 2, group 1, No. 30, 58.7 grains; and Class 2, group 3, No. 17, 59,2 grains, Moreover, other classes of coins which must be admitted to be late in date such as the cast copper coins, have values of 58.7 to 61 grains, supported by ½s of 29 and 30 grains.

Yet, elsewhere, lower values undoubtedly existed, for instance, Allan's Part II, Class 2, groups 4 to 6, show a maximum weight of 55 grains, supported by a ½ stater of 84 grains, indicating the existence of the normal kãrsãpana of 56 grains. Allan suggests there was also a lighter kārsāpana of 52 grains, which is borne out by his Kausambi series. The existence of these half-staters conclusively identifies the karsapana as a \frac{1}{3} of the stater and a thirtieth of the silver equivalent of the gold Daric. This, as we have seen, was 1680 grains when the kãrsāpana weighed 56 grains. It was 1773 grains at the time of the issue of the bent bar coins, and this must be taken to indicate a rise in the value of gold, possibly due to scarcity. Indian alluvial gold, long since exhausted, was plentiful in the early days of the Achaemenian Indian province and the antiquity of the measure of approximately 56 grains, going back to the earliest electrum coins and proto-coins, suggests that the normal kārṣāpaṇa of 56 grains is older than the heavier standard of the bent bar coins. Yet, as Allan rightly insists, the Indian punch-marked coinage is highly organised and shows little signs of development. He is, therefore, reluctant to allow it a very long history. However, we know that it existed side by side with the Persian siglos and the Greek-Asiatic 1 of the stater. It, also, was in competition with Attic imitations.

All coinage is open to variation, but variations in a widely spread coinage, which is in contact with other systems, cannot be treated as purely geographical features. Their significance is likely to be historical, depending upon changes in the basic measure and/or in the relative value of the precious metals. In any case, one coinage is likely to react upon another through the rate of exchange. Variations in the Indian punch-marked groups must, therefore, be set beside variations in other systems.

The western system, as summarised in the note on Metrology at the end of the British Museum Catalogue, provides interesting parallels. The maximum weight of the staters of the Phoenician and Rhodian systems are given as 225 and 236 grains and thus have fractions ($\frac{1}{4}$) lying between 56.25 grains and 59 grains. In other words, these coins are $1\frac{1}{3}$ of the basic stater, which is one tenth of the silver equivalent of the gold *shekel*, which was the *Daric*, and lay between 168.75 and 177 grains. The Catalogue gives the stater of the Persic system as being 175 grains and its $\frac{1}{3}$ was, therefore, 58.3 grains. All these values indicate that these silver coinages were derived from the silver equivalent of the gold *Daric* of approximately 130 grains, and show a fairly stable gold:silver ratio of about 1:13 $\frac{1}{3}$. But it must always be remembered that the weight of the *Daric* was the old *shekel*, the one sixtieth of the *mina*.

It must, also, not be forgotten that just as the $\frac{1}{3}$ of the basic stater produced the Indian $k\tilde{a}rs\tilde{a}pana$, so the $\frac{1}{2}$ produced the Persian siglos. Unfortunately the punch-marked coins set out in Allan's Part II classification do not provide sufficient fractions to indicate the details of the Indian system. Indeed, this paucity of coins other than the $k\tilde{a}rs\tilde{a}pana$ may be regarded as indicating a difference in period, for as has been shown Allan's Part I coins provide the stater and significant fractions, and in the later issues of Taxila and Mathura they abound.

The fractions of the basic stater may be set out as follows:-

1	==	170 grains	1	_	170 grains
3	-	129 grains			85 grains
3 8	=	66 grains			57 grains
1	===	44 grains			33 grains
1 8	-	22 grains			8

To these may be added the following:-

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4 \times \frac{1}{3} (57.3 grains) = 229 grains 5 \times \frac{1}{4} (43 grains) = 215 grains 5 \times \frac{1}{3} (57.3 grains) = 286 grains \frac{1}{3} \times 57.3 grains = 19.1 grains
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As against these theoretical values, Allan's Kuninda series provides the following weights:-

 $\frac{3}{4} = 130 \text{ grains}$ $\frac{3}{16} = 30.5 \text{ grains}$ $\frac{3}{8} = 66 \text{ grains}$ $\frac{1}{8} = 22 \text{ grains}$ $\frac{1}{4} = 42 \text{ grains}$

Moreover, Allan's Mathura Class II series gives the following weights:-

 $\frac{3}{4} = 130 \text{ grains}$ $\frac{3}{8} = 66.5 \text{ grains}$ $\frac{1}{2} = 86.5 \text{ grains}$

Sodãsa, also, has:-

 $\frac{3}{4}$ = 130 grains $\frac{1}{2}$ = 86.5 grains

-while the Pańcala Suryamitra has:-

1 = 175 grains

The same system is found consistently throughout Allan's Taxila coins, the following being samples of the weights catalogued:-

1 = 175 grains $\frac{3}{4} = 129 \text{ grains}$ $\frac{1}{2} = 86 \text{ grains}$ $\frac{1}{3} = 58.5 \text{ grains}$

Here there are signs that the actual stater in use was somewhat more than 170 grains. Indeed, it approximated very nearly to 173.3 grains, the weight derived from the silver value of the established *Daric* of 130 grains at 1:13 $\frac{1}{2}$. At the same time, the $\frac{1}{3}$ of the stater becomes less frequent, though it does appear in Allan's Taxila Var. d, which he regards as weights, with the value of 57 grains, side by side with the $\frac{1}{4}$ = 43 grains.

Turning to the Indo-Bactrian issues and to Prime Chronology, the Sophites coins (Cunningham 61/62) weigh 58.5 and 56.5 grains, and Antimachus, also, has a coin of 58.5 grains.

The tetradrachms of Demetrius I weigh consistently 260 grains, while the drachma's of Euthydemus II and Antimachus weigh respectively 66 and 65 grains, Antimachus' having also a hemi-drachm of 32 grains.

These tetradrachms are exactly twice 130 grains and $1\frac{1}{2}$ times the weight of the one tenth of the silver equivalent of the gold *Daric* which is, therefore, clearly the basis of these issues. The tetradrachm of 260 grains was, therefore, equivalent to 3 sigloi of approximately 87 grains. At the old exchange ratio of gold to silver of $1:13\frac{1}{3}$, the gold shekel, the Daric, to which all these issues are tied, still weighed about 130 grains, that is to say, the value of gold against silver seems to have been maintained for some time after Alexander's conquest, though it eventually did decline. As Gardner points out $1:13\frac{1}{3}$ is a convenient ratio, for it makes the siglos $\frac{1}{3}$ of the shekel and, as the Daric weighed a shekel, Darics could be used as weights as coins often have been. We have seen that the old Persian karash weighed ten Darics. However, the system, which had lasted so long, was altered somewhat in

the coinage of Menander. His small silver issue runs up rather irregularly to about 39 grains, which Gardner would accept as the Phocaean hecte. But 39 grains are \(\frac{2}{3}\) of 58.5 grains, the \(\frac{1}{3}\) of a basic stater of 175.5 grains, and, as has been seen, these values occur in Allan's Class I coins. That the basic stater varied is clear from the weights of the coins, for the fractions often tally exactly with the stater, and this happened in Greece as well as in India. The range of the variation is indicated in numerous well defined issues, which may be theoretically summarised as follows:-

Lydian: 168, 128, 84, 56, 42 grains

Phocaean: 175.5, 131.4, 87.7, 58.5, 43.8 grains Ionian: 177.25, 133, 88.5, 59.1, 44.25 grains Persian: 172, 129, 86, 57.3, 43 grains

In terms of actual coin weights, Gardner's early electrum series of Ionian coins is of special interest. It provides coins of 269, 133.5, 133.5, 133.4, 67.6 and 45 grains. Such a series implies a basic stater of 180 grains and a \(\frac{1}{3}\) of 60 grains. The Greek-Asiatic \(\frac{1}{3}\) is thus seen to have at this early period about the same range as the Indian \(karyaapana\) and no deductions as to date can, therefore, be made on this evidence. It is likely that there were local variations in the commercial weights in use. It is, also, possible that the gold:silver ratio varied commercially and that these changes are reflected in local issues. However, deductions based on changes in the ratio have not always been convincing. Gardner seeks to impose a ratio of 1:12 on the Attic gold issue of 133 grains, making its silver equivalent 1596 grains, a sum which is not represented by any known coins. At 1:13\(\frac{1}{3}\) the silver equivalent would be 1773 grains. These gold coins would, therefore, be worth ten silver coins of 177 grains. Coins of 177 grains exist and are, indeed, supported by convincing fractions:—

 $2 \times \frac{3}{4} = 266 \text{ grains}$ $\frac{3}{4} = 133 \text{ grains}$ $\frac{1}{4} = 44.25 \text{ grains}$

Conclusions

Bimetallism depends on the availability of pure silver and gold, and pure gold was not available until just before the Persian period. It is universally agreed that the early coins of electrum, gold and silver are struck on a silver standard. That is to say, an approximate ratio between the value of gold and silver was already in existence commercially. This accounts for the weight of the dumps which may be regarded as proto-coins. The contemporary *shekel* was less than the *shekel* of 130 grains which Darius adopted as part of his reform of his currency. The silver equivalent of the Persian *Daric* which weighed 130 grains was based upon the ratio of gold to silver of 1:13\frac{1}{3}, and these data form the basis of the silver issues, which included the Greek-Asiatic issues, the Persian *siglos* and the

Indian kārsāpana. The one tenth of the silver equivalent of the Daric divided by two gives the siglos of 86 grains, and divided by three the kārsāpana of 57 grains. The weight of the gold shekel was increased to 133 grains in the Attic issues and is represented by coins of that weight. The Persian siglos of 86 grains remained remarkably stable, but the Greek-Asiatic 1 and its equivalent, the Indian kãrsãpana, varied from 52 grains to nearly 60 grains, However, these variations cannot be used to date the issues. The system based on the silver equivalent of the gold shekel varying between 130 and 133 grains persisted for some time after Alexander's invasion of India, and so apparently did the old exchange ratio between gold and silver of $1:13\frac{1}{3}$.

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The Photographic Department of the Institute

by M. B. COOKSON

Five years ago the Institute removed to Gordon Square. Two years prior to the completion of the new building, the Photographic Department was allotted space on the 4th floor. This allotment gave approximately 15% more floor-space than at St. John's Lodge; and this single compact unit took the place of the more scattered accommodation in the old building.

The chief functions of the photographic studio have always been the teaching of archaeological photography and the production of photographs, lantern-slides and the like for teaching and research. Experience in the cramped basement conditions in Regents Park provided a sound basis on which to plan the new studio, the aims being both to provide for increasing use and to ensure that the various processes should operate as far as possible side by side, with the minimum disturbance of one by the other. At St. John's Lodge the single large darkroom had served a variety of purposes, but required to be re-organised and 'prepared' for each change of use. Even so, difficulties of movement and circulation led to inefficiency, loss of time and wastage of materials.

When the new plans were prepared, therefore, there were three main requirements. First, to exercise control over the studio the whole layout must be seen at a glance. Secondly, the students must have room to move and work in comfort with the instructor able to see all that was happening and to move round amongst cameras and students whilst teaching. Thirdly, if production could proceed at times when students were in the studio output might be increased and speeded up without undue stress.

1. Taking the photograph

For practical teaching seven cameras can now be operated at one time in the studio if the occasion warrants. The changing or loading of films is carried out in the changing room and the two student darkrooms, the layout of which can be seen in the plan. One person's lighting of a subject which is on his bench does not interfere with that of another, because there is sufficient space between them.

2. Negative development

In general practice, and on similar subjects, most students arrive at a similar speed of operation, and so are usually ready to enter the negative developing room together. One student may develop the batch, or more probably students follow each other in rapid succession to the tanks, each immersing his own negatives, with the last comer setting the time clock. This 'standard system' of negative development works extremely well and quickly in the early stages of teaching, and reduces the waste of teaching material.

3. Drying

Negative development, fixing and washing are thus all carried out in the one area. The next stage, drying, takes place in the area next to that devoted to negative development. From the drying area negatives are taken into the printing and enlarging room for printing.

4. Printing

In the printing room benches round the walls are provided for the printing of negatives either made by contact or by projection equipment. The wet bench, which incorporates a main sink to cope with wet operations, occupies the centre of the room, and is equipped with central baths for the fixing and preliminary washing of prints. Again circulating space is important, as is plenty of elbow room at bench and sink. The central sink, for which no originality is claimed, becomes the demonstration bench in the early stages of teaching; it has justified its installation in ease of working and saving of time and material.

5. Finishing

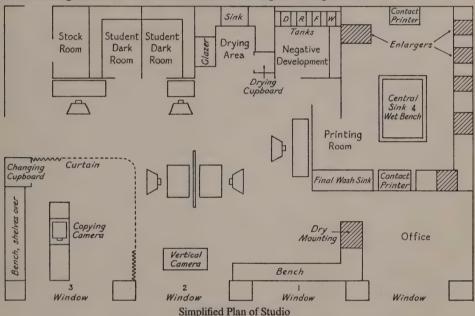
Little 'finishing' is undertaken on the teaching course. Drying or glazing only are carried out in the drying area of the main studio.

PRODUCTION

With the growth and extension of the Institute's activities, demands made on the Photographic Department are heavy, frequent, and of an infinite variety. The idea of a 'task area' plan will have become apparent in what has already been said on the organisation of a photographic studio for teaching purposes. For the production of prints and other finished work the important requirement was a system so arranged that print production and teaching could when required continue side by side. This has been achieved by a careful study of the areas taken up with student operations, so that without disturbing the teaching programme, research and publication needs, as well as the production of lantern slides and the like, can be dealt with in some quantity.

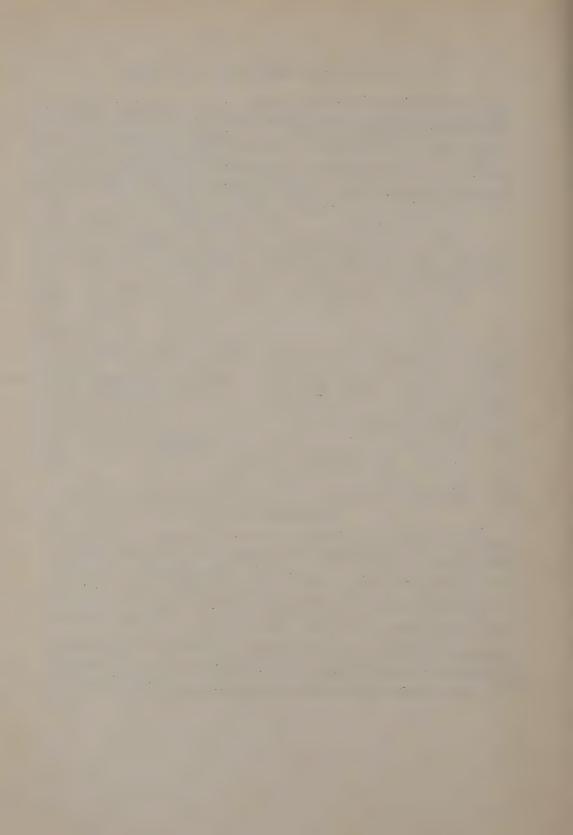
THE PHOTOGRAPHIC DEPARTMENT OF THE INSTITUTE

In general practice, work begins near the copying area with its changing room right alongside the copy camera. Objects in the round are photographed in the second window or on one of the central cameras, which are those also used by students. As in the organisation of the teaching, the successive processes take place in the loading area, the negative development area, the drying area (negative), the printing area, and the drying area (print). Finally, the material goes to the finishing area in No. 1 window for checking and despatch.



The plan illustrates the simplicity of working arrangements. The large open studio has the various operational rooms opening from it. The student darkrooms become "loading rooms" during class periods. When not in use by students the Institute is sometimes able to offer visiting archaeologists from overseas full laboratory facilities should they need this in order to re-load films, check their work, etc. It it also possible, if necessary, to close off and black-out completely a small area for working colour films by artificial light.

The experience of five years has demonstrated that the layout efficiently meets the teaching and general photographic demands made upon it though these demands have increased very considerably. No alterations or improvements have as yet suggested themselves. The studio is illustrated in Plates I and II.



Thin Sections of British Neolithic Pottery: Windmill Hill—A Test-Site

by I. W. CORNWALL and H. W. M. HODGES

The thin-sectioning technique, originally developed many years ago for the petrological examination of hard rocks, has for some time past been in use for the study of soils¹ and of relatively incoherent geological and archaeological sediments.² Laborious as is the preparation of such sections, the ability to see into the minute fabric of a specimen, with its mineral grains and interstitial matrix in their original positions, enables the somewhat practised eye rapidly to recognize their nature and even to arrive at some conclusions as to the way in which the material was formed. This visual information is at once more specific and more rapidly obtained than any procurable by means of physical or chemical analysis, though these classical methods still retain their value undiminished in their own field, especially when quantitative estimations are needed. Thus, two materials giving identical bulk-analyses might often be distinguishable at a glance by their micromorphology and mineralogy, when seen in thin section.

Discussing problems of technology and environment in relation to prehistoric pottery-fabrics, it became clear to the authors at an early stage that much could probably be learned about the raw materials and techniques used in their manufacture by treating small potsherds as if they were soil- or rock-specimens and preparing them as thin sections for microscopical examination. Some preliminary trials showed that the problems of impregnation with plastic for strengthening, and of the grinding, cementing, final polishing and mounting of the specimens were in no way different from those already successfully solved in the preparation of thin soil-sections—indeed, primitive earthenware in most respects closely resembles some natural soil-materials, save that, in many cases, the clays, as they occur in nature, require some artificial addition of grits to improve their working-properties. The nature and amount of such added 'fillers' may often be recognized in the thin section.

With the whole range of prehistoric pottery before us, it was obviously necessary to select for study, first of all, material of a single period and area, which could be expected to present a certain unity and not raise too many side-issues.

² Cornwall, I. W. (1958) Soils for the Archaeologist, 141-151.

¹ Kubiena, (1938) Micropedology, Collegiate Press, Ames, Iowa, U.S.A., 243 pp.

Once familiar with the norm and range of variation within that restricted field, we could hope to widen the scope of our inquiry to other places and periods.

Our first experiments have, therefore, been confined to the Neolithic wares of the single site of Windmill Hill. The reasons for the choice were twofold: specimens are numerous and have been thoroughly studied from the purely archaeological standpoint by Dr. Isobel Smith and many others, and, secondly, the camp is situated on the western edge of the Marlborough Downs Chalk country and so should provide samples fairly representative of the earlier Neolithic pottery tradition in that particular environment.

A considerable number of samples has now been sectioned by Mrs. Barton, Honorary Assistant in the Environmental Department, and we are in a position to put forward some preliminary conclusions as the result of our study of them.

It will be useful, first, to consider the local sources of raw materials and the properties of these. Apart from outliers in situ of Eocene sediments, of which, save for the residual sarsens, there are no known examples near Windmill Hill, there are two possible sources of pottery-clay. Alluvial clays from the Kennet valley have been formed by washing of all available materials down slopes on to the floodplain, of which chalk is overwhelmingly preponderant. Since these sediments are inevitably strongly calcareous, and as a result flocculated and unplastic, they do not lend themselves to working up into pottery. Moreover the ware would, on firing, become so porous as to be generally useless as a container for liquids.

The other obvious source of raw material is the Clay-with-Flints. This occurs, sometimes in quite extensive areas, scattered over the whole of the Chalk outcrop. It consists chiefly of the acid-insolubles remaining after weathering away of a considerable volume of chalk. The flints are an obvious constituent, but there is, even in the very pure Upper Chalk, some 1% or less of reddish silty and clayey material, which includes also a small amount of very fine quartz sand. This was doubtless terrigenous sediment, washed and blown into the Cretaceous sea at the time of the deposition of the Chalk. On solution under weathering of the calcareous matrix, this siliceous and aluminous material was concentrated on the surface of the Chalk, wherever the site was not subject to denudation so rapid as to prevent its accumulation.

This process has been going on ever since the Chalk was upfolded and exposed to subaerial weathering, so that the residual insolubles from its secular decay have undergone many environmental changes. In particular, the Chalk, wherever not covered by Eocene sediments (the so-called Lower London Tertiaries, including, in Wiltshire, the Reading Beds, London Clay and Bagshot Sand, in that stratigraphical order) was subjected to weathering during the later Tertiary (Oligocene, Miocene, Pliocene) Periods, so that the Clay-with-Flints often

assumes the character of a braunlehm or rotlehm weathering-soil of tropical type. Thus, it is not only completely decalcified, and even acid in reaction, but (more important in the present connection) practically all weatherable minerals that it may once have contained have been decomposed, save only flint, quartz, ferriciron salts and clay-minerals. In places where Eocene deposits once overlay the Chalk, the Clay-with-Flints may also contain some quartz-sand, quartzite (sarsen) and clay-materials not originating solely in the Chalk, but derived from the Lower London Tertiaries. In the Windmill Hill area, where the presence of numerous sarsen blocks points to an original cover of Reading sediments, this component may be quite important, but is difficult to assess because it does not, apart from the sarsen, contribute sensibly to the variety of the mineral suite present.

As had been anticipated, the greater part of the pottery from the site is, by these criteria, of local manufacture; but even here one may distinguish between two broad classes. On the one hand we find sherds in which the clay matrix is extremely fine (Pl. III, 1) and on the other some in which the matrix contains a high proportion of quartz of fine grade (Pl. III, 2). Both could be derived from deposits of Clay-with-Flints. Dr. Smith, as a result of field-work, was able to provide two clay samples which, when fired, gave very comparable results: the one a fine, highly plastic Clay-with-Flints (Pl. III, 3) the other (a so-called 'brickearth') a more manageable, slightly coarser clay from the base of a Clay-with-Flints deposit (Pl. III, 4).

From the very beginning of this study Dr. Smith drew our attention to one small group of wares which could be distinguished not only by the obviously different nature of the filler, but also by the character of the surface burnish more carefully finished than that to be seen on other pottery from the site. Sherds of this type had also been excavated, but not distinguished, at Maiden Castle, while from Robin Hood's Ball Mr. Nicholas Thomas recovered a single sherd of this character, incidentally scratch-decorated with what might reasonably be interpreted as a prehistoric 'doodle'. It is important to appreciate that Dr. Smith had already singled out these wares as being distinctive before any thin-sectioning was carried out.

The sherds of this type from Windmill Hill are of a ferruginous clay containing, as filler, relatively large crystals of quartz, felspar and hornblende (Pl. IV, 1). Although all the grains are composed of distinct minerals, the weathering is not such that they have become rounded or decayed, in any way, and they remain sharp and angular. The filler would thus seem to be derived from a naturally occurring sand, itself deposited at no great distance from the parent rocks from which it was weathered. An alternative suggestion, that the filler may have been made by crushing igneous rocks, cannot be accepted, since this process is most un-

likely to separate completely the different mineral components as would be the case during weathering.

The highly burnished sherds from Maiden Castle that have been sectioned are virtually identical in fabric (Pl. IV, 2), while the single sherd from Robin Hood's Ball, although very similar in composition (Pl. IV, 3) shows a rather greater degree of weathering of the mineral grains which remain, nevertheless, relatively large and unrounded. It seems, therefore, inescapable to conclude that these wares were imported into the regions in which they were found.

It will be remembered that, in his study of the neolithic wares from Hembury, H. H. Thomas suggested that one group (the f pottery) was foreign to the region and most probably derived from the 'border of the Dartmoor granite mass'. The composition of these wares given by Thomas, and the single sherd from this site that we have been able to section ourselves (Pl. IV, 4) compare well with the sherds from Maiden Castle and Windmill Hill, and we see no reason to argue with Thomas' general observation about the source of the raw materials. Furthermore, it seems clear that the only rational explanation would be that it was the wares themselves that were imported into the chalkland areas rather than the raw materials for their manufacture; although whether the pottery was imported as goods in its own right, or simply as a container for something else, is a speculation that cannot be pursued here. Even so, it must be pointed out that these raw materials could be found in other areas of igneous rocks, as for example parts of Wales or Brittany, and one cannot totally ignore the possibility of the 'foreign' wares being imports from these regions. Archaeologically speaking, this seems a very remote probability, especially when one takes into consideration Dr. Smith's original thesis that these highly burnished wares represented a distinct type, and that their presence has not been observed beyond the limits of the Wessex chalklands.

A third group of neolithic wares selected for further examination had already been recognised by Dr. Smith as containing onlitic limestone filler, and the object of thin-sectioning in this instance was to study in more detail the nature of this filler. Three alternative explanations could be advanced for the presence of onlitic limestone in this group of wares: the rock might have been imported, crushed, and used as filler; imported rock might have been allowed to weather, and the product used as a filler; or the wares themselves might have been an import from the onlitic limestone region. As the thin-section shows (Pl. V, 1), the first of these alternatives can be ruled out immediately since all the onlitic material present is clearly a natural weathering product, each rounded grain standing distinct in the clay matrix with no sign of the cementing lime material. The second alternative,

⁸ Thomas, H. H. (1932) in *Proc. Devon Archaeol. Expl. Soc.* 1 (1929-32), 175

equally, seems unlikely, since there is a remarkable absence of flint in the sections. Even the more plastic Clay-with-Flints usually contains some angular fragments of flint, and had this been used as the clay material, filled with oolitic limestone weathered on the spot, one would expect to find some flint present in the section, more particularly when the probable working conditions of the potter are taken into consideration. These oolite-filled wares can, thus, only rationally be looked upon as imports from the north or west of Windmill Hill. Wares of the same character were noted by Mr. Nicholas Thomas at Robin Hood's Ball, and all that has been said above can equally be applied to the sherds we have sectioned from this site (Pl. V, 2).

One cannot, obviously, point to a source for the raw materials as precisely as in the case of the finely burnished wares, since oolitic limestones have such a broad distribution, but one can delimit the area in which such materials are naturally unobtainable. Thus from Windmill Hill the nearest possible source would be about twenty miles to the north-west, while from Robin Hood's Ball the distance would be even greater.

The implications of these results are far more fundamental than might at first appear, for they must radically affect not only our interpretation of the phenomena of the neolithic period in southern England, but also an established article of faith firmly held by many prehistorians. We can no longer assume that, because it may appear to us excessively fragile, prehistoric pottery was never transported. Undoubtedly the vast bulk of sherds from any prehistoric site can be shown to be of local manufacture: to what extent a small proportion may prove to be imported is a matter for future research. In any study of ceramic change involving social contact the exchange of pottery itself is a fact, now established, that we can no longer afford to ignore.

In so far as the primary neolithic cultures of the British Isles are concerned, it is no longer necessary to imagine a mobile secondary neolithic population to account for trade in such goods as stone axes, for the same trading activities that brought axes of Groups IIa and IVa⁴ from Cornwall to the Wessex chalklands could account for the presence of pottery from the same general region on these early sites.

⁴ Stone, J. F. S. and Wallis, F. S. in Proc. Prehist. Soc. 17 (1951), 99-158.

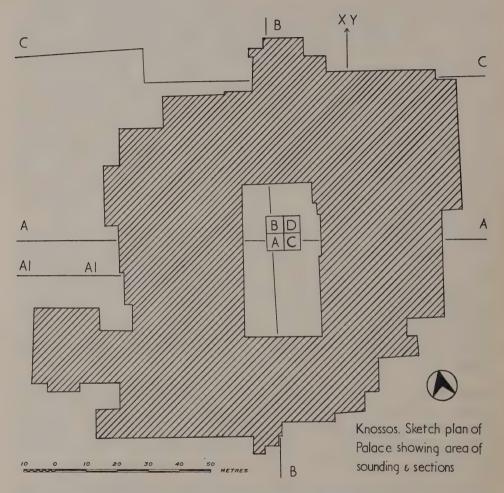


Fig. 1. Diagrammatic plan of the Palace showing the position of the main sounding and the lines of the sections.

Excavations in the Neolithic Mound of Knossos 1958–60

by J. D. Evans

The importance of the exceptionally large and long-lived Neolithic settlement discovered by Sir Arthur Evans beneath the remains of the Minoan palace at Knossos¹ has long been evident, and the desirability of a closer examination of the deposit has been widely felt among archaeologists. With this in mind, the then Director of the British School at Athens, Mr. Sinclair Hood, planned to include such a project in the present series of British excavations at Knossos. Early in 1958 he invited me to undertake the direction of a substantial sounding which had been tentatively begun by the School in the previous year. I accepted, and the work was carried out in three consecutive seasons, from 1958 to 1960.2 An area of the deposit beneath the northern half of the Central Court of the Palace was examined down to bed-rock, and in the final season a further trench was cut through the Neolithic levels at the extreme northern edge of the site, near the boundary of the present enclosure. The relatively full picture of the material culture, history and development of Neolithic Knossos which was obtained has greatly augmented previous knowledge. It has amply confirmed the importance of the deposit as a key to the understanding of the Neolithic period in Crete, and perhaps also to some aspects of the island's later history. A short account of the new evidence and the tentative conclusions drawn from it therefore seems an appropriate contribution to the present miscellany.3

Evans, preoccupied mainly with the problems of the Minoan Palace, investigated the Neolithic settlement only in a limited way, chiefly by means of a series of test pits, which produced a considerable amount of material, but little or no information about the nature or layout of the settlement. The only exception to this was the work undertaken in the 1923 and 1924 seasons to clear the foundations of some houses belonging to the latest stage of the Neolithic, traces of which were actually visible before excavation on the surface of the Central Court of the Palace.⁴

¹ Evans, Sir A., The Palace of Minos at Knossos I (1921), 32-55.

I have to thank the Faculty Board of Classics and the Crowther-Benyon Fund of the Department of Archaeology, at Cambridge, and the British School at Athens for grants towards the cost of the excavations. I am also most grateful to the Central Research Fund of London University for grants to cover the cost of my travel to and from Greece for each of the three seasons, and again in 1962 to study the finds. Finally, I should like to thank all those who helped with the work, as field assistants or architects, and not least my wife for her constant help at all times.

³ The full report will appear in Volume 59 of the Annual of the British School at Athens.

⁴ Evans, Sir A., The Palace of Minos at Knossos II, i (1928), 1-21.

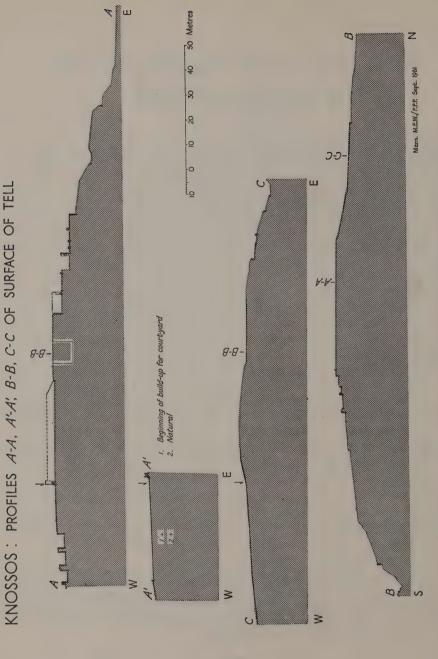


Fig. 2. Sections through the Kephala hill, showing the position of bedrock below the Neolithic deposit. Area A-D is marked on A-A below the Central Court. The measurements below the West Court marked on A'-A' were made in one of Evans' test pits (probably B13) which has been kept open.

The most important results of Evans' work were the demonstration that an exceptionally large Neolithic settlement which had endured for a considerable time (the deposits were up to 10 m. deep) had existed at Knossos, and the construction of a pottery sequence. The latter was the work of Dr. Duncan Mackenzie, who, by analysing carefully the pottery from two test pits, kept separately by successive metres from the surface, was able to distinguish three distinct phases of development.⁴ These were subsequently adopted by Evans, and have remained standard.

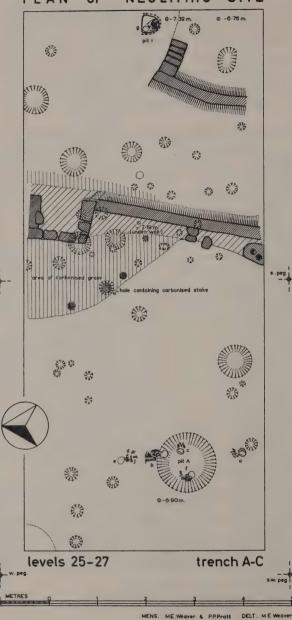
A division of the first of these into Early Neolithic I and II was subsequently proposed by Dr. Audrey Ozanne (née Furness), who re-examined the whole of the original material, and published a most valuable study of the pottery from the test pits and late houses.⁵ The new excavations have confirmed this broad picture of the pottery development, including the subdivision of the Early Neolithic. For the moment it is not possible to say more than this, but when the study of the great quantities of new stratified material has been completed it should provide an extremely detailed picture of the evolution of this industry in the Knossos settlement.

The area of the main sounding of the present excavations was a square with sides eleven metres long, which was divided up into four smaller areas of five by five metres (squares A—D) with baulks one metre wide between them (Plan, Fig. 1). The whole of this area was excavated to a depth of about 2.5 metres, when the foundations of a large square structure were found in the northern squares, B and D. After clearing this house, which proved to belong to the Middle Neolithic phase, and part of another, slightly later, structure which lay to the west of it, we suspended operations in these two squares, and only carried the two southern ones (A and C) down to bed-rock, which was met with at depths varying from about six metres in the westernmost part to rather over seven metres at the eastern end. After the removal of the baulk between the two squares the total area cleared to bed-rock was a rectangle measuring eleven by five metres. The cutting at the northern extremity of the Palace enclosure (called XY) was a one metre wide trench running north-south. Parts of several superimposed houses were found here before bed-rock was reached, a little over two metres below the surface.

I shall first describe our findings in the main sounding, dealing with the levels in the reverse order to that in which they were dug, so as to give a picture of the history of the site, in so far as we were able to establish it. The first settlement on the hill of Kephala as found at the bottom of Area AC was probably simply a large camp site. Below the lowest house floors lay a more or less uniform dark deposit with an average thickness of about twenty centimetres, the product of intensive

Mackenzie, D., 'The Pottery of Knossos', Journ. Hellenic Studies, 23 (1903), 158–64. Furness, A., 'The Neolithic Pottery of Knossos', Annual Br. Sch. Athens 48, (1953), 94–134.

Knossos Palace Central Court PLAN NEOLITHIC SITE of



Shaded walls are in layer 25. Heavily stippled post holes contain a high percentage of ash and charcoal. Carbonised grain area indicated by vertical shading (this area passes under the shaded wall).

Skeletons of Children

b in layer 25b immediately under wall b in layer 25b immediately under wall c in layer 25b but lower than a and b d in layer 26 on top of e (very few bones)

e in layer 26

f in layer 27 in pit A

g in pit 1 under stone

Fig. 3. Plan of the lowest levels uncovered in Area AC, showing the position of the carbonised grain.

habitation over a short period. The rock itself was honeycombed with pits, large and small, and with smaller holes which seem to have been post- and stake-holes (Plate VI, 1). In one place, near the northern edge of the excavation, the soil was full of grains of carbonised cereals (Fig. 3). This area, which lay partly outside our trench, was bounded on the south by a series of small stake-holes, one of which still held the carbonised stump of its stake.⁶ The scatter of carbonised grain passed beneath the wall of one of the earliest buildings.⁷

Apart from the features just described, the most striking discoveries in this level were the skeletons of a number of children (Plate VI, 2). Six of these, ranging in age from newly born to about seven or eight years old, and one foetus, were found laid in a line running roughly north-south (Fig. 3). The older children were in a crouched position, but there were no grave goods. In one instance, one of the bodies had been laid just above another. This little cemetery lay immediately below the floor and walls of one of the earliest structures (Plate VI, 3), but there seemed to be no evidence that the two were in any way connected. At some distance from this group of burials, on the extreme eastern edge of the excavated area, yet another skeleton of a small child, probably between four and five years old, was found crushed into a little oval pit cut in the natural, which had been covered with an oval stone. Again there were no accompanying objects. These finds are of especial interest, since they are the only human remains so far found in Neolithic levels at Knossos. It does not seem to have been the custom at any later period to bury even children within the settlement.

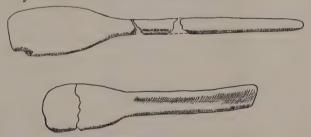
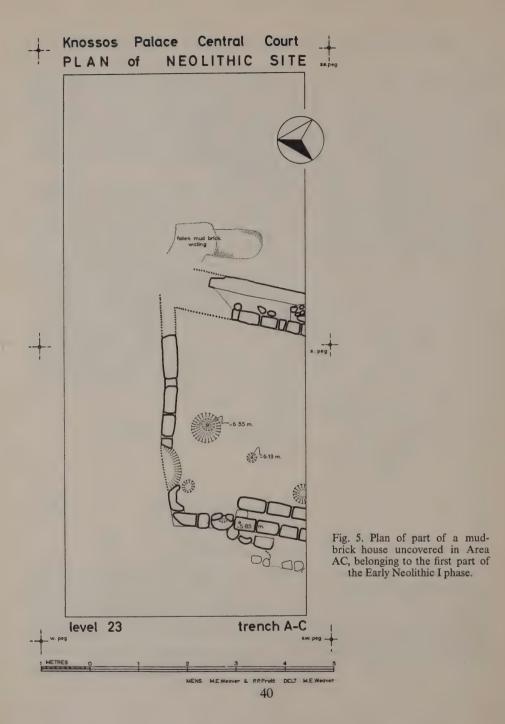


Fig. 4. Bone spatulae from the camp level $(\frac{1}{2})$.

Animal bones were found in considerable quantities in this first level, and there were a number of stone and bone artefacts, including some quite large pieces of obsidian. The most distinctive of the bone objects were a pair of long-handled

⁶ A sample of this wood was studied by Miss A. C. Western, who found it to be oak, almost certainly a deciduous, not an evergreen, species. Another portion was submitted to the British Museum radiocarbon laboratory for analysis. The result of this is given below, page 51.

A small sample of this grain was shown to Dr. H. Helbaek, who identified naked hexaploid wheat together with some emmer and barley. It is hoped to submit a larger sample for full analysis eventually.



spatulae, a type not met with in any later level (Fig. 4).⁸ A surprising feature was the complete absence of pottery, which only begins to appear in the next level, and then only in relatively small quantities at first. This presumably reflects a stage before the manufacture of pottery was organised on the site, not a 'pre-pottery' stage of the culture itself, since when pottery does appear it is by no means primitive, but is evidently manufactured in accordance with a tradition originally developed elsewhere.

Immediately above the dark level which lies on bedrock, the deposit became brightly coloured and variegated, being composed almost entirely of the debris of mud bricks from collapsed buildings, which had been burnt to a variety of shades. This multi-coloured deposit was about a metre thick on the average and contained two separate building levels. In the first of these the main feature was part of a rectangular room about 4 m. in width (Fig. 5 and Pl. VI, 4). Its length could not be ascertained because it lay partly outside the southern limit of the excavation. The material of construction was mainly bricks, but these were in places oddly mixed with stones, particularly in the eastern wall. Under the northern wall was a line of stones, bedded in earth, forming a foundation. The stones used were usually discarded querns, mortars, and perhaps door sockets, all of which were also unusually abundant elsewhere in these levels. It was evident that this building had been altered and rebuilt several times. There was more than one floor level, but the lowest was well above the bottom of the brick wall. At one time the floor was on two levels, with a kind of raised daïs at the western end. In the western wall was a narrow entrance, which had at some time been blocked up with stones, mostly querns, as usual. When the walls were dismantled, one of the bricks from the northern wall was found to have two clear imprints of the forefeet of a goat. It will be seen from the section (Fig. 6) that some bricks apparently connected with the eastern wall go through the dark level to bedrock. Probably these were placed there to fill up a hole, or make firmer a soft spot in the deposit below. The rest of the eastern wall was all at a higher level, and at its northern end it passed over the area of carbonised grain described above. Little was found in the house; it was evidently kept thoroughly clean, as were all the other houses we found.

A little to the east of the room just described we found the remains of another brick wall which ran diagonally across the area in a north-westerly direction and then turned south-east. It was impossible to tell what kind of construction this wall had formed part of. It had been cut through by later pits, and the greater part of the building must in any case have lain outside our area.

A third example, from the same level, is more roughly shaped. The finding of these objects so closely associated with the remains of carbonised grain and numerous quern stones seems to confirm the suggestion that they may have been used for scraping the flour off the querns after the grain had been ground.

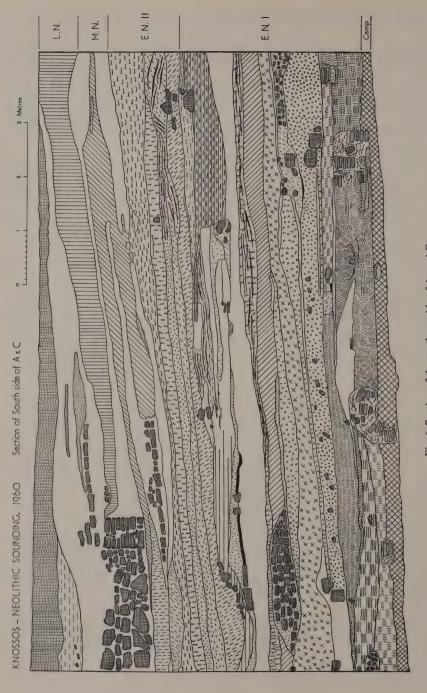


Fig. 6. Section of the southern side of Area AC.

Unshaded areas = washed out mud walls; shaded = occupation debris; panelled shading = brick debris.

After the final abandonment of the first house, another was erected above, once more having walls mainly of mud-brick. This rectangular room, with beaten mud floor, lay partly above, partly to the west of the earlier structure (Pl. VI, 5). Its orientation was also slightly different, the long sides running NNW instead of due north. There was little left of this room, which once again lay partly outside the excavated area. The north-west wall had completely disappeared, and the floor came to an irregular end on this side. On the south-west, the part of the wall which lay within our area was only one brick thick. On the opposite side of the room the wall was also thin, and the surviving part consisted of clay in which it was difficult to distinguish any traces of separate bricks. Neverthless, there were remains of bricks nearby which may well have derived from fallen upper courses. No stones were found in either of the surviving walls of this room.

Near the northern end of the floor of this room were two more or less rectangular areas, one slightly larger than the other, the surfaces of which were flat and hard, and were surrounded by raised rims which seemed to indicate that there had been some kind of superstructure. They may perhaps be the floors of brick ovens. A shallow, circular pit in the north-east corner of the room was found to be full of ashes. It cut very slightly into the north-east wall, but it nevertheless appeared to be contemporary with this structure, and not cut down from a level above. A small pit or post-hole nearby, which cut more deeply into the wall, was, however, most probably a later feature. This building, like its predecessor, and like all later houses which we uncovered, was kept scrupulously clean, and little archaeological material was found inside the walls. Pieces of clay with impressions of wattles found throughout these early levels may suggest how these houses were roofed. They were not found in later levels.

This was the latest example we found of building in mud brick. All subsequent buildings were of pisé on stone foundations. Pisé may even have been used for the upper parts of the walls of the first house. At all events the thick band of whitish material which was found just above the remains of the east wall of this house (see Section, Fig. 6) looks very like the later deposits produced by the collapse of pisé walls. It is impossible to know for certain what produced the change in building methods, but it seems fairly reasonable to suppose that the inhabitants of the Neolithic town discovered that it was unnecessary to make fired bricks in the relatively dry conditions of lowland Crete. At all events, the change-over made a great difference to the appearance of the deposit. Instead of the bright, variegated colours produced by the debris of fired bricks, all later levels are drab and more or less uniform. Whitish or yellowish bands, more or less sterile of archaeological material, alternate with thicker, darker layers which are A mass of brick debris which was found lying over them probably represents the collapsed superstructure.

generally very prolific of finds (Fig. 6). The former represent the washed out mud walls of houses, the latter habitation debris, in which the building material is mixed to a greater or lesser extent with food and other refuse.

The first building of the new type found in Area AC lay in the level just above that which contained the last mud-brick structure. It consisted of two rectangular rooms, which filled rather over half of the total length of the excavated area. Each of these rooms measured about 4 m. by 3 m., with the longer axis running almost directly north-south (Pl. VII, 1 and 2). The orientation was thus almost exactly similar to that of the earliest mud-brick building. To the north, both rooms seemed to open at adjoining corners onto a cobbled area which was immediately lost under the northern limit of the excavation. The floors were of hard, smooth mud, but in each room it was found that there had been, at different times, numerous small hollows in them, all of which had been more or less discoloured by the action of fire. After use they had been covered with fresh mud. Not all can have been in use at the same time, since in some cases new ones had been made partially overlapping examples which had already been covered. The average diameter was about 20 cm. A larger example, perhaps a real 'cooking-hole' was found in the cobbled area, which may have been a yard. The walls, of which only the stone foundations survived, were also apparently covered with a smooth mud plaster. The task of distinguishing this from the collapsed mud of the upper walls which covered it was made a little easier by a fire which had burned in the north-east corner of the east room, turning some of the plaster on the wall behind to a rosy colour which stood out clearly from the khaki mass of collapsed walls. In the north-west corner of the west room a small irregular area was enclosed by small stones and floored with baked mud, on which lay fragments of a pot. It may have been for cooking, or possibly a small 'cupboard' for storage. We found similar things in later houses.

Above the remains of this house, which lay at a depth of about 5.5 m. below the Palace court we found no more architectural remains in Area AC of any importance. Throughout the later life of the settlement it seems to have been an open space between houses in which various domestic activities took place, into which rubbish was thrown and over which from time to time spread layers of mud from the destroyed walls of neighbouring houses.

Much material was found in all the darker levels, consisting of refuse and broken objects jettisoned by the inhabitants of nearby houses. By far the most numerous finds were of fragments of pottery, of which there were enormous quantities, followed by bone implements, mainly points of various kinds and flakes of flint, obsidian and rock-crystal. Rather less numerous finds were fragments of stone axes, stone mace-heads, and quernstones, and finally a series of figurines of stone,

shell and clay. Apart from the small finds, however, the deposit generally offered little of interest. Now and then there were flimsy walls which ran across some part of the excavated area, in most cases certainly not those of houses, though probably connected with buildings lying just outside our area. They may well have enclosed small yards attached to the houses. Patches of pebble flooring appeared from time to time, which were probably intended to level up part of the area, or perhaps to prepare it for some special uses. Sometimes many animal bones were found on these floors. Hearths containing animal bones were also a frequent feature, as also small circular hollows bearing traces of fire. These 'cooking-holes', which were found in many levels, but especially in the lower ones, were sometimes simple hollows, but there was also a more complex type, found only in E.N. levels, which consisted of a bowl-shaped depression, with a smaller cup-shaped hollow in the centre. These were usually made and finished with evident care, the surfaces being hard and smooth, and the shapes very exact. They also usually bore traces of fire. On occasion we found several of these in one level.

At a depth of about 3.25 m. we found the remains of a series of very small rectangular chambers, only about 1 m. by 1.50 m., in the south-east corner of Square A. The walls were of the usual stone and *pisé* construction, but it was difficult to believe that they had been carried up very high, or that the areas enclosed had been roofed. There was no entrance visible to any of them, but there was a 'cooking-hole' in one. They were probably attached to a house lying to the south of the excavated area, and perhaps served as working areas.

Up to this point the pottery had all been of types corresponding to the Early Neolithic I phase of Furness, but about 0.50 m. above the structures just described there was a fairly rapid change to an assemblage of Early Neolithic II type, particularly notable being the disappearance of plastic and dot-filled incised patterns. The Early Neolithic II deposit was only a little over a metre thick, but the Middle Neolithic deposit above it was even thinner. In Area AC it varied from about 0.25 m. to about a metre in depth. The Late Neolithic again averaged about a metre in depth. These later levels slope downhill towards the east even more markedly than the earlier ones, and so depths below the surface of the Palace court have little meaning (Fig. 6). When the court was constructed the surface was levelled by means of a fill which contained Early and Middle Minoan, as well as Neolithic sherds. This was naturally deepest at the eastern end of the area excavated by us, but did not exist at all at the western end, where the Late Neolithic levels had been cut into and the surviving paving slabs of the court rested direct on undisturbed Neolithic deposits.

In the Middle Neolithic levels the remains of some fairly massive stone walls, or foundations of walls were visible in the southern face of Square C, which evi-

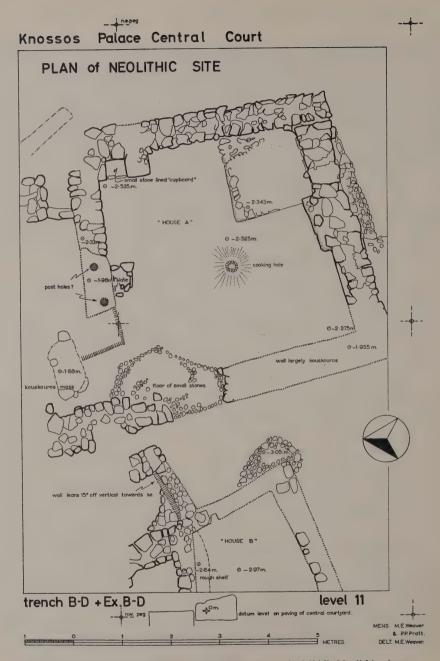


Fig. 7. Plan of houses uncovered in Area BD, belonging to the Middle Neolithic phase.

dently belonged to buildings which lay further to the south. There were two of these walls, one of which lay above the other. The second one was much the more massive, and was preserved to a height of about a metre. At its western extremity was the butt end of another wall which had evidently run south at right-angles to it. We made some attempt in the final season to ascertain what kind of a building this was, but without much success, since it appeared to be much damaged and we were not able to open up a big enough area to get a full idea of it.

However, we were able to uncover a quite well preserved building in the same level to the north of Area AC, and lying mainly in square D. It was almost square in plan, with internal dimensions of about 3 m. by 3 m., and walls about 0.50 m. thick (Fig. 7 and Pl. VII, 3). The rubble foundations of this house, which stood about 0.30—0.40 m, high, were very difficult to pick up at first, because they consisted only in part of solid hard stone, and mostly of kouskouras, the soft, decayed limestone so abundant in the district. This was very little different in texture from the mass of calcarious mud from the collapsed walls of the building, which covered it to a depth of nearly a metre, and which formed a level which could be traced right across Area AC up to the walls of the building in its southern face mentioned above. This room presented several notable features. It was floored with beaten mud and the walls covered with mud plaster as usual. Near the centre there was a simple circular depression, reddened by the action of fire, and nearby the floor was stained black with ash evidently raked out of it. In the south-east corner of the room was a square platform, raised to a height of about 0.20 m. above that of the rest of the floor. It was surrounded by a kerb of kouskouras, and the top of the platform was formed, like the floor, of beaten mud.

In the centre of the south-east wall a section of it projected slightly into the room, forming a feature similar to the internal buttresses so well known in the architecture of the Sesklo culture in Thessaly and that of Hacilar in Anatolia. There were two recesses formed by small flat slabs of stone set on edge, one near the north corner, the other in the centre of the north-west wall. Both these 'cupboards' contained the remains of relatively large storage jars. A pair of holes in what appeared to be a smooth mud platform on top of the wall-foundations just behind the second of these recesses is difficult to explain. It could have been the bottom of a large window divided into three lights, but there remains the possibility that the holes were for wooden uprights intended to strengthen the *pisé* walls. There was a doorway in the north-west corner of the room of a remarkable kind. The wall containing the two post-holes ended abruptly short of the south-west wall, and was finished off with a quite regular butt-end. The south-west wall, however, continued straight on past the line of the former and disappeared under the northern edge of the excavation. The plan thus recalled somewhat that of the

peculiar building at Magasá,¹⁰ though we found no trace of a return parallel to the north-west wall (it might, of course, have lain outside the excavated area). Another flimsy piece of walling was found to run north-westwards from a point near the north corner of the room, but it clearly could not have sustained any super-structure.

A little to the west of this structure lay the remains of a smaller rectangular room which had its walls oriented in exactly the same directions as those of the square room (Pl. VII, 4). Though it seemed at first to belong to the same level as the larger structure, we found that it was in fact slightly later. Part of the deposit had been cut away on the south-west so as to level the slope on which it had to be built, and this brought the base of the walls down almost to the same level as those of the other. A prolongation of one of its walls was also found to lie over the remains of the prolonged south-west wall of the square building. The conclusions derived from this fact and from a study of the section were confirmed by the pottery found in both rooms, though, as usual, there was in fact little of this within the houses. The small room produced some, however, which proved to belong to the Middle Neolithic/Late Neolithic transition, whereas the few sherds found in the larger room were pure Middle Neolithic.

The Middle Neolithic date of the large room was confirmed more fully by a curious discovery made in the top of the yellow level representing the collapsed walls. Two shallow oval pits were found, one in Square D and another in Square C, cut into the yellow deposit, and each containing a number of complete, though badly crushed pots (Pl. VIII, 7). These included jars (Pl. VIII, 5), cups, carinated bowls, two large hole-mouthed pots (Pl. VIII, 6), one of which was fitted with a clumsy spout, and an elegant ladle with a large wish-bone handle. We can, of course, only guess at the reason for the deposition of these caches of pots, but they give the impression of some symbolic act connected with the abandonment and destruction of the house below. The pots are all clearly of Middle Neolithic date, and several have the finely rippled surface so characteristic of the phase.

The later building remains found consisted of part of a rectangular room, several times reconstructed, which lay in Square D. Only the stone foundations of the south-western and south-eastern walls were found, the other two walls having evidently collapsed down the steep north-east slope. These building remains, of little interest in themselves, were securely dated by pottery to the Late Neolithic phase. A trench cut in the second season enabled us to link the stratigraphy of the new sounding to the house foundations uncovered by Evans in the southern part of the court, and this showed clearly that our Late Neolithic room

Dawkins, R. M., 'Excavations at Palaikastro, IV', Annual Br. Sch. Athens, II (1916), 260-68.

belonged to the same level, though at a point where the hill was beginning to fall away sharply towards the Kairatos valley.

The sounding at the northern limit of the Palace area consisted of a narrow trench, XY, 7 m. long but only 1 m. wide. Despite its restricted width, made necessary partly by considerations of time but mainly by the disposition of remains of later buildings which had to be left intact, this yielded very interesting results. The deposit here proved to be just over 2.50 m. deep. There were no Late Neolithic levels, but immediately below the surface a thin Middle Neolithic stratum was found, except in the extreme south of the trench, where there was a disturbance which ultimately proved to be the top of a late well cut right through the Neolithic deposit. Below the Late Neolithic stratum came deposits producing pottery of E.N. II type. In the uppermost of these was found a section of wall made of stones, and orientated identically to those of the Middle Neolithic and Late Neolithic houses found in Area BD. E.N. II pottery continued to appear pure in the succeeding levels, and a few more fragments of rather scrappy walls were found. However, the main architectural find in Trench XY was in a level somewhat over 2 m. below the surface and only about 0.40 m. above bedrock.

This was the complete corner of a large rectangular room. The stone foundations of the walls were well built and preserved to a height of about 0.50 m., and the floor itself was of hard light-coloured plaster. The orientation of the walls was the same as those above. In the angle of the corner which fell within the trench was a square space outlined by flat stones set on edge which contained the remains of a storage vessel. The small area to the north of the room which was included in our trench produced a pebble pavement at the same level as the house-floor, on which were scattered numerous meat bones, including astragaloi of cattle. Near the southern part of our trench, where the house wall was cut through by the well, there were traces of a small partition wall running north-east, and again remains of a pot in the angle between this and the major wall. It thus seems likely that this house contained more than one room.

From the pottery found in the level above and in the debris around the house, it is clear that it belonged to a transitional phase from E.N. I to E.N. II, or to the very beginning of E.N. II, since clear E.N. II pottery was mixed with a few sherds of E.N. I type. Below the foundations of this house there was a thin layer of deposit, about 0.20–0.30 m. thick, with bedrock immediately below. The lowest level produced very little pottery, which, however, seemed to contain the same mixture of E.N. I and E.N. II types as the levels above. There were therefore no real E.N. I levels in this part of the settlement, and we can only conclude that the E.N. I settlement was smaller than that of the later phases, at least on this side of the site. The lack of L.N. levels is probably to be explained by their having

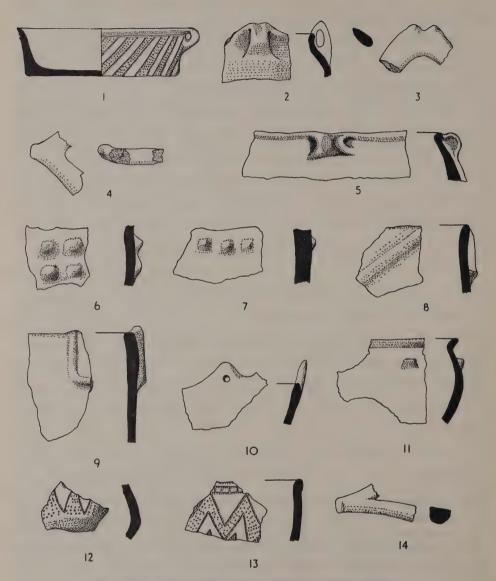


Fig. 8. Sherds from the earlier levels of the Early Neolithic I phase (‡).

EXCAVATIONS IN THE NEOLITHIC MOUND OF KNOSSOS 1958-60

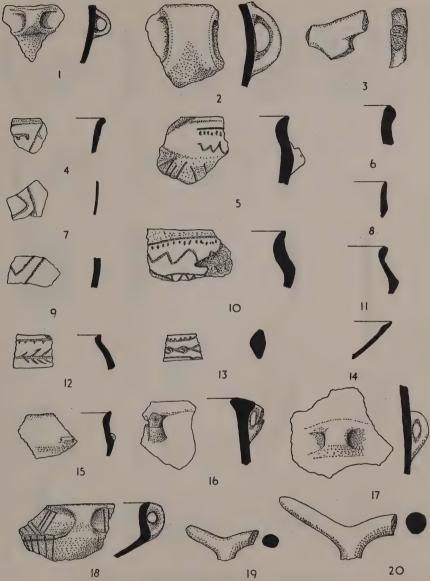


Fig. 9. Sherds from Early Neolithic II and Middle Neolithic levels (‡). (Nos. 1-14, E.N.II; Nos. 15-30, M.N.)



Fig. 10. Sherds from Middle and Late Neolithic levels (\frac{1}{2}). (Nos. 1-6, M.N.; Nos. 7-19, L.N.)

been removed during building operations in later times, though of course it is possible that the settlement shrank again in size. Even the exiguous traces of M.N. at this point could be simply wash-down from houses situated a little further south rather than remains of occupation on the spot. (For selected sherds see Figs. 8-10).

Perhaps the most striking thing to be observed about the building remains found in our northern trench is that the E.N. II houses appeared to have exactly the same orientation as the M.N. and L.N. building remains found in Area BD in the Central Court. This would seem to imply, not only that there was a generally accepted orientation for all the buildings in the settlement, but that this became traditional, and was preserved over a very long period, at least from the beginning of the E.N. II phase. On the other hand, new buildings were not always erected on the same spot as those in the level below; indeed, this seemed to be exceptional. Nevertheless, the displacement was usually not complete; new buildings normally overlap the old ones in part, and the relation of buildings to open spaces seems to have been relatively constant. Area AC, for instance, seems to have been an open space from a little before the middle of the E.N. I period onwards. Before this there were houses in it, and their orientation varied somewhat from time to time.

The most impressive thing of all about the Neolithic site at Knossos is its size. It seems clear that, at its maximum extension, it must have covered an area of at least eleven acres, since Neolithic material has been found up to the limits of the Palace site on all sides. In size, at any rate, it approximates more to a township than a village, though much more extensive excavation would be necessary to determine whether this would also be true of the social organisation. The material equipment, on the other hand, in so far as it survives, reveals a community at a relatively low level of specialisation and technological achievement. The most numerous finds by far were fragments of pottery, with only occasionally a complete or almost complete vase. Pottery was absent entirely from the lowest level, before the erection of the first permanent buildings. Thereafter sherds appeared. at first in small quantities, but rapidly growing in numbers. It is evident that the production of pottery was not at first organised on the site by the settlers, and it seems that they brought none with them when they arrived. When they did begin to produce it, they worked skilfully in what was evidently a well established tradition developed elsewhere. There is nothing primitive about their first efforts. During most of the period of the Neolithic occupation it is evident that production was on a large scale, and may well have been the work of at least part-time specialists.

Large numbers of bone tools were found, most of them being points made on ribs, tubular bones or joints. There were also, however, some 'chisels' and 'gouges' of bone, and very occasionally other types, such as a joint which appeared to have

been used as a grinder or polisher, and a tubular bone which might have been a bobbin. Numbers of animal incisor teeth found singly in the deposit prompt the idea that possibly they might also have been used as small chisels or gouges. Flint, obsidian and rock-crystal are all found in the form of small chips and flakes, and sometimes blades, but implements are extremely rare. In the lowest levels, however, towards the bottom of the E.N. I deposits, the flakes are noticeably larger, including those of obsidian, and the percentage of retouched pieces is higher.¹¹

Small axes of various kinds of igneous stone are found right through the deposit. Stone mace-heads also occur, but they are very rare in the lower levels. An example from an E.N. I level is very roughly made and has a biconical perforation. The really fine examples, pear-shaped or spherical, with a tubular perforation, and made of attractive variegated stone, are only found in the upper levels.

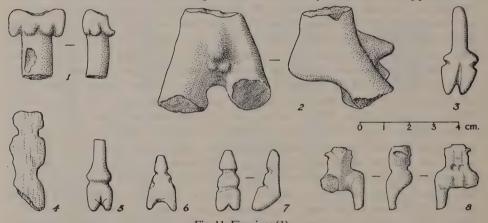


Fig. 11. Figurines $(\frac{2}{3})$.

1. Clay, from level of first brick house; 2. clay, from a Late Neolithic level; 3. shell; 5-7. stone from the late E.N.I period; 4. bone from E.N.II level; 8. probably marble, representing a crouched figure, found together with Pl. IX, 1.

Prominent among objects of terracotta other than pottery are clay spindle-whorls, loom-weights, and the so-called 'shuttles." Surprisingly, however, we found that all these types only began to appear during the course of the Middle Neolithic, and that there was no trace at all of them in any earlier levels. While the facts are interesting, their significance is doubtful. Do they mean that spinning

Evans, Sir A., The Palace of Minos at Knossos I, Fig. 10.

The total amount of material involved is very small. All the obsidian found in all levels could have come from a simple moderate-sized core, and flint is even scarcer. Obsidian is most common in the lowest levels but rock-crystal does not appear at all until E.N.II.

and weaving were introduced into Crete for the first time only at this stage, or were spindle-whorls, weights, etc. previously made of perishable material? Spinning, of course, might have been done without the use of whorls. Some of the loom-weights have just two holes, but a number of rectangular or oval plaques of clay perforated at all four corners which were found in the same levels may well be also connected with this complex. They could be another form of loom-weight.

Roughly circular sheets of schist which were found abundantly at all levels had evidently served as covers for pots, but in the later levels there were also roughly conical plugs of sun-dried clay which would have been effective for covering jars with a narrow or medium-sized neck.

Clay figurines representing cattle, mostly very rough, but in some instances quite well modelled, with a burnished dark surface, were found in the Middle and Late Neolithic levels only.

A large and varied series of representations of the human form was obtained, and these came from all levels, though styles changed considerably in the different phases. Figurines of very different types were found in the Early Neolithic levels. The one with the earliest associations is the small clay female torso (Fig. 11, 1), found in the destruction level of the earliest brick house. Only a little later (probably just after the destruction of the second brick house) two deep pits were dug, in one of which was found a fine stone figurine and amulet (Pl. IX, 1; Fig. 11, 8). The figurine appears to represent a male, perhaps wearing a loin cloth or penis-sheath. Both are of hard white stone, apparently marble, and are unique. I know of no close parallels, either in Crete or elsewhere. These pits also contained some complete pots of early E.N. I types (Pl. VIII, 2, 3).

A little higher, above the level of the first *pisé* house, but still well within the E.N. I levels, we found a small fragment of a clay figurine, comprising the upper part of the torso (Fig. 12, 4). The polished surface is red-brown in colour, and it somewhat resembles some from the Greek mainland attributed to the Sesklo culture.¹³ In the latest levels of E.N. I and earliest of E.N. II we found a series of highly schematised representations of standing human figures in stone and shell (Fig. 11, 3, 5–7), as well of the first examples of the squatting type in clay. These, and the more or less cross-shaped ones, also in clay, whose lower part, for one reason or another, is missing, are the normal types from Early Neolithic II onwards. Some are definitely female, some of indeterminate sex. The one exception to this is the portion of an indubitably male figure from a Late Neolithic context in F. (Fig. 11, 2). Another exceptional figurine is a small and simple one made on a slip of bone, found in an E.N. II level (Fig. 11, 4). Its closest parallels

¹³ e.g. Schachermayr, F., Die ältesten Kulturen Griechenlands (Stuttgart, 1955) Pl. V, 1a and b.

are with some found in Troy II and III,14 a fact which may have cultural, but hardly chronological, significance.

All through the deposit large numbers of discs cut from potsherds were found, which vary much in size, some being very small indeed. They may have had some practical purpose—some perforated ones could have been used as spindle-whorls

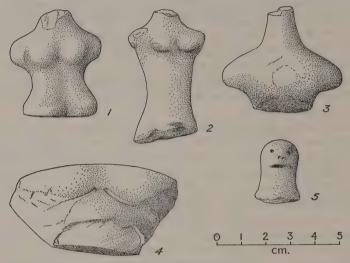


Fig. 12. Figurines $(\frac{2}{3})$.

1-3. Clay, from E.N.II levels; 4. upper part of torso, clay; from earlier part of E.N.I phase. 5. clay; from a Late Neolithic level.

—but on the other hand it is possible that they were used as counters in some sort of game. In this connection the finding in an E.N. II level of a heap of astragaloi of cattle, is also of interest, since these were later so much used for games, and as dice.¹⁵ Elsewhere, however, we found part of another astragalos which had been split down the centre and seemed to have been employed as a rubber or polisher.

No trace of metal was found anywhere in the deposit, but two tiny fragments of azurite and one of malachite were found just above bedrock, in levels associated with the earliest brick house. Almost certainly these must have been appreciated for their bright colours rather than as copper ores, since no metal tools or ornaments were found, but their presence is clear evidence of overseas connections.

e.g. Blegen, C., Troy 1, 2, Plates (Princetown, 1950), 360, 37, 49, 35, 60.

The presence of large numbers of astragaloi of sheep and cattle was also noted in the Neolithic deposit at Phaistos (Mosso, A., 'Ceramica Neolitica di Phaestros e Vasi dell' epoca Minoica Primitiva', Monumenti Antichi 19 (1908), 147 f.)

They could have come from Paros, or from the west coast of Asia Minor, though of course they might also have come from even further afield.

It would be impossible here to attempt any full study of the implications of the new finds, but a few remarks about some of the more obvious conclusions which can be drawn may not be out of place. The most important new information concerns the history and architecture of the settlement. The large size of the settlement and its long duration had been appreciated from the beginning, but we can now go a good deal further than this. The first settlers on Kephala Hill arrived precipitately and only subsequently began to organise their existence. Production of pottery began at about the same time as the erection of the first houses, made principally of fired mud-brick. This building material was subsequently abandoned in favour of packed mud set on stone foundations. Houses assumed a common orientation which became traditional. The E.N. I phase lasted a long time, during which the settlement may have been growing in size. By the E.N. II phase it had probably reached its full expansion and must have covered an area of no less than eleven acres. The technique of house construction underwent little basic change during the later Neolithic phases, and the traditional orientation was preserved until the end of the period. Our excavations have added little information about the transition to the Early Minoan period at Knossos, because the latest levels of the Neolithic settlement have probably been removed, like most of the Early Minoan deposits, by subsequent building activity.

The detailed pottery sequence obtained has emphasised the uniqueness of the Early Neolithic phases of the Knossos settlement, first noted by Mackenzie. Nothing like this pottery is known from any other site in Crete, with the possible exception of some sherds from the site of Katsambá, a couple of kilometres to the north-east of Knossos. Pottery identical with that of our Middle Neolithic phase has, however, been found recently at Mitropolis, near Gortyna, on a site excavated by the Italian School. Most of the sites known in Crete seem to belong either to the Late (in the Knossos sense) or Sub-Neolithic.

Two samples of charcoal from the new excavations, out of five submitted, have so far been processed by the British Museum radiocarbon laboratory. The first, from level 26 (the camp level), gave a date of 6100 ± 180 B.C. (B.M.124) for this first level. The second, which came from level 16 (at the top of the Early Neolithic II deposits) gave 5050 ± 180 B.C. (B.M.126). These dates, compared with all those suggested on archaeological grounds since Evans, are surprisingly high. At

¹⁶ Mackenzie, D., op. cit., 158.

¹⁷ Alexiou, S. 'Ανασκαφαί εν Κατσαμπά', Πρακτικά, 1954, 369-376.

¹⁸ Unpublished. I was able to see this material through the courtesy of Dr. Doro Levi, Director of the Italian School.

the moment they cause difficulties of various kinds, though none which seems an insuperable objection to their acceptance as basically correct. In a general way they are in line with the other dates so far obtained for Neolithic sites in Western Asia and the Aegean.

The first problem is an unusual one. Sample two came from about two-thirds of the way up the deposit. This means that nearly four metres of debris had accumulated at Knossos in about a thousand years. Accepting the absolute dates as correct, we are faced with a period of well over 2000 years more to the beginning of the Minoan period. To fill this we have only, at Knossos, a further two and a half metres of deposit. The building remains found in this are the same as earlier, and in other respects also the nature of the deposit is identical with the rest, so that we should expect a comparable rate of growth. Two explanations seem possible. Either the site of Knossos was for some reason abandoned for a time during the later stages of the Neolithic, or a considerable depth of deposit was removed from the top of the mound during operations to level it in Minoan times.

Neither of these explanations is particularly attractive, but the second seems at any rate the more plausible. It is quite certain that the uppermost levels were cut into at the time of the levelling of the mound, but it would be difficult to be sure of exactly how much was removed in this way. It would be surprising, though, if many levels had been cut away without leaving some traces on the slopes of the mound. Furthermore, the great mass of material removed in this way would have to have been dumped somwhere, and surely ought to have been recognisable from the mass of broken pottery which it must have contained.

Nevertheless, a gap in the sequence at Knossos remains a possibility, and there is material from other sites in Crete which could be used to fill it. The Neolithic culture found at Phaistos, for instance, is almost certainly later in date than anything found so far at Knossos. The pottery has different shapes, painted or crusted decoration, and other features, including the nose-bridge handle, which are not represented at Knossos. There is also a considerable amount of material usually labelled Sub-Neolithic, which comes from a number of sites in Crete, and which may represent a still later phase or phases.

Finally, a word must be said about the external relations of the Knossos Neolithic. Since there is no trace up to now of the existence of any earlier inhabitants in Crete, it seems reasonable at the moment to suppose that the people represented by the remains found in the earliest levels were colonists who had come to Crete by sea from elsewhere. Hence the material obtained from these lowest levels is of the greatest importance, since it ought to give us the best pointer to the ultimate origins of the Neolithic inhabitants of Crete. There can be little doubt that the material found in these levels points quite conclusively to the origin

EXCAVATIONS IN THE NEOLITHIC MOUND OF KNOSSOS 1958-60

of the colonists in Western Anatolia, thus supporting and reinforcing the view held by Evans¹⁹ repeated by Pendelbury²⁰ and endorsed by Furness. In support of this conclusion reached on the basis of the artefacts, and especially the pottery, Dr. Helbaek has informed me that the combination of food plants represented by the grain found in level 26 leads him to believe that they too must have come from Asia Minor.

The closest parallels of the Knossos pottery are with material usually classified as Late Chalcolithic in Anatolia. General parallels can be drawn with the Büyük Güllücek material of the central plateau, though this includes features, such as the thumb-grip handle, which are not found at Knossos, and with some of the Chalcolithic pottery from Mersin, but these are not close enough to suggest any very direct relationship.²¹ More surprisingly, perhaps, the E.N. I pottery of Knossos seems to have little resemblance, except in the general features of the ware, colouring and technique of decoration, to the Beycesultan type of Late Chalcolithic pottery in south-west Asia Minor.²² But indeed, if the C 14 dates are correct, Knossos E.N. I must be contemporary with the painted pottery Hacilar culture in this area which precedes the Late Chalcolithic dark incised wares.

What the Early Knossos pottery does suggest quite strongly is an affinity rather with the traditions of north-west Anatolia and the northern Aegean islands, the tradition exemplified at Kumtepe, Troy, Poliochni and Chios. Of course all this material is much later, and contains many features not found at Knossos. The same is true of the material studied by Furness in her 1956 publication from Samos, Kalymnos and Chios. But to my mind the points of contact are so many and so close that I venture to suggest that this north-west Anatolian tradion has a much longer history than has been suspected to date, and that, in an earlier and simpler form, it may have been the parent of the Knossos culture. In a recent article Mr. D. H. French has traced a southward expansion of the culture of

¹⁹ Palace of Minos I, 14.

²⁰ Pendelbury, J. D. S., The Archaeology of Crete (London, 1939), 42.

Some sherds, indistinguishable from the Neolithic pottery of Knossos, were allegedly found by T. E. Lawrence at Byblos in 1911 (Woolley, C. L., 'Early pottery from Jebeil', Anns. of Arch. and Anthrop., 10 (1923) 36-40) and were presented by him, together with other sherds of types otherwise well-known at that site, to the Ashmolean Museum. Since no other sherds of this type have come to light in the extensive work carried out at Byblos they have come under increasing suspicion, but it has not been possible to discount them entirely. A search in the records of the Ashmolean which I carried out with the kind co-operation of Dr. H. W. Catling revealed that the Lawrence sherds fall into two distinct groups. The first, containing sherds presented by Lawrence in 1911, shortly after his return from the trip on which he had collected them, contains no sherds other than normal Byblos types, which in no way resemble the Cretan Neolithic. The second group, which contains all the Cretan-type sherds, along with others of normal Byblos types, was not presented until 1914, and not registered—doubtless because of the disorganisation created by the First World War—until 1922, eight years later. In view of this, I think that it is virtually certain that there was some confusion of material, either by Lawrence himself, or—much more likely—while the sherds were lying unregistered in the Museum.

²² Mellaart, J., 'Excavations at Beycesultan, 1958. The Chalcolithic Sounding', Anat. Studies 9, 38-47.

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Kumtepe Ib to the Cycladic islands.²³ Could a similar, but much earlier, expansion have followed the same route and reached Crete? It is all very hypothetical, but at least the earliest Knossos material and its new dating seem to point to a serious gap in our knowledge of the Neolithic of western Asia Minor.

²³ French, D. H., 'Late Chalcolithic Pottery in North-west Turkey and the Aegean', Anat. Studies 11 (1961), III and Fig. 15, 21-24.

Verulamium—Then and Now

by S. S. Frere

Sir Mortimer Wheeler had completed his four years' work at Verulamium before he became the first Director of the Institute of Archaeology; but the site has other close connections with us. The Theatre was excavated by Dr. K. M. Kenyon; in 1949 a training school directed by Sir Mortimer Wheeler did important work on the Forum; and since 1955 for seven years the city has been the concern of the present writer. It is fitting that to celebrate the Jubilee of the Institute an attempt should be made to assess the importance of the site then, and its lessons for us now.

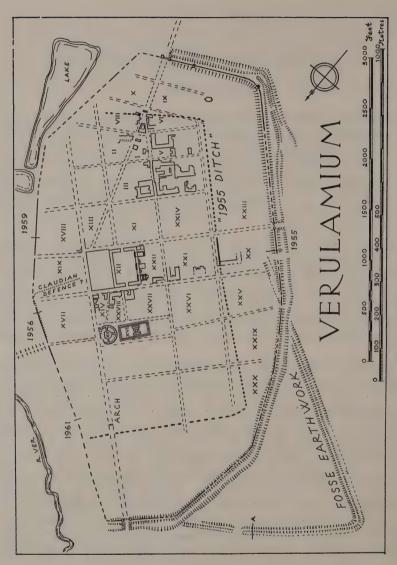
Today Verulamium is the largest of our still unbuilt-on Roman city-sites, and the one with most to tell, from work already done, of growth and history. Other town-sites in Britain offer, or once offered, comparable opportunities, but none of these is so large. Wroxeter has been little explored, too little for a fair sample. Silchester is more completely dug over yet only in the horizontal plane, and little can be said of its history until further work is carried out:1 Caistor-by-Norwich is almost completely unknown to us despite excavations of unrecorded extent thirty years ago.

It is natural to ask whether the historical results obtained from Verulamium have a wider relevance than for the local history of the town itself. Once already, indeed, the attempt has been made by R. G. Collingwood to base the history of Roman urbanisation in Britain on that of Verulamium: but this attempt was not successful if only because the facts upon which it was based were not themselves derived from a fair sample of the town. Today we have double the area excavated and a correspondingly more balanced assemblage of facts. In other towns also since the war excavations have been going on, and these towns are not the open ones available before, but the still built-up ones whose facts are correspondingly more precious. We have a better-founded picture of Verulamium, and we have a wider collection of comparative material against which to check deductions.

The discoveries of the Verulamium Forum inscription,² and of a hitherto unknown defensive circuit, at least as early as the Flavian period³ and centred on

What little can be said has been brilliantly said by G. C. Boon in his Roman Silchester (1957).

Antiq. Journ. XXXVI, 8; J.R.S. XLVI, 146. Antiq. Journ. XL, 2; XLI, 80.



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VERULAMIUM-THEN AND NOW

the Forum (but later levelled as the town expanded), have enhanced our appreciation of the urbanising policy of the Flavian Emperors in Britain, and of governors such as Agricola. This confirms the hints of history, and of excavation elsewhere, for instance of the late Flavian first theatre at Canterbury,⁴ the first baths at Wroxeter,⁵ or the first forum at Cirencester.⁶ But the real emphasis of the recent discoveries has been to point to an earlier urbanising phase, begun under Claudius himself.

Rivet⁷ has pointed to the military origins of many Romano-British towns in the communities of traders which sprang up outside forts. There is little doubt that a military post of the Conquest period existed at Verulamium in the area between the Theatre and the river, where its rampart has been found at one point.⁸ But though this fort left its permanent mark on the map of Verulamium in the oblique course of Watling Street across the subsequent, though still Claudian, street-grid in the southern portion of the town—for the main road makes straight for the fort—its influence otherwise was probably slight. Archaeological evidence in Insula XIV points to the layout of the civil buildings, and thus to the foundation of the municipium, at a date not later than c A.D. 50, by which time, if not long before, the garrison will have departed. The town's origin, as its status shows, is due rather to Prae Wood than the fort.

To the reign of Claudius belong the first colonia at Camulodunum, about which excavation has been able to tell us little, and the foundation of Roman Exeter⁹ where the same is true. At Canterbury also little can be said of Claudian buildings, but several of the streets of the rectangular grid can be shown to date as early. At Silchester virtually nothing is known of the streets or buildings of the Claudian town. At Verulamium not only can a number of streets laid out on a rectangular grid be shown to be pre-Flavian (Fig. 2) but also in Insula XIV there has been revealed a colonnaded street with shops planned as portions of larger units, the whole in half-timbered construction and dating to the reign of Claudius. Clearly a great effort was already being made at this early period to build a town of Roman pattern. That the buildings were timber-framed is no surprise, for masonry buildings are everywhere rare in the first century A.D. except for public buildings; and the effort required even to provide the necessary quantities of cut and

⁴ Frere, S. S., Roman Canterbury, (1962), 11, 28.

⁵ Atkinson, D., Report on Excavations at Wroxeter 1923-27, (O.U.P. 1942).

J. Wacher's Excavations of 1961, Antiq. Journ. XLII, 5-8.
 Town and Country in Roman Britain, (Hutchinson, 1958).

Excavation in 1961 some 1127 feet further north and west failed to find this rampart below the later river-side defences, where it must have continued had it formed part of the municipal defences linking up with the '1955' ditch: Antiq. Journ. XLII, 150.

Fox, A., Roman Exeter, (Manchester U.P., 1952), 16-17.



Fig. 2

VERULAMIUM -- THEN AND NOW

seasoned timbers must have been immense, ¹⁰ especially when we reflect that the architecture involved was wholly new and strange to Belgic Britain (Fig. 5). Surely the Roman army must have been called upon to supply not only the architects and craftsmen but also the huge stockpiles of seasoned timber required; and the effort both public and private put into the planning and construction of the first Verulamium, though surely not in its details unparalleled in contemporary Britain, can reassure us that the status of a Roman *municipium*¹¹ was indeed deserved.

This first flowering of city-life was rudely destroyed by Boudicca in A.D. 60.¹² The defensive circuit, if already in existence, was unable to stand up to massed attack. There may have been a shortage of weapons, for the *Lex Iulia de vi publica* forbad Roman private citizens to carry arms, and its provisions had been enforced on the province as a whole by Ostorius 13 years before: in any case the retreat of the governor Paulinus up Watling Street would have drawn away many potential defenders. The wooden city was consumed by fire.

The effects of the sack were serious. Eventually the colonnaded street and shops of Insula XIV, still in half-timber, were reconstructed, but not for almost 20 years. Early coins of Vespasian and Flavian samian in the earliest floors prove that the rebuilding did not occur before c. A.D. 75/80. Now they arose at the same time as the great new forum across the street, which bears Agricola's name. It was Frontinus and after him Agricola who turned failure into success once more, and revivified the ruins. Not long afterwards a new masonry macellum, or market hall, arose in Insula XVII across Watling Street from the site of the future Theatre; and the temple of Insula XVI was now constructed in stone (Fig. 3). It seems clear that this slow recovery, so long delayed, is no good context for a Flavian grant of municipal rights: by contrast the rapid growth of the first phase exactly suits a grant by Claudius. From A.D. 61 to c. 75 the main street of the sacked city lay largely in ruins. No doubt there was big talk of reconstruction (as in post-blitzed London) but nothing was done or, at the best, rebuilding was going on elsewhere than in the centre.

The second century was the great age of the formal city in Britain as elsewhere. At Verulamium things at first developed slowly. Soon after the beginning of the century the first-century defences were levelled or slighted; but nothing at first replaced them. Streets continued beyond their line and houses were built outside. The wooden buildings in Insula XIV required reconstruction from time

In the comparatively small area excavated it can be calculated that a length of 1274 yards—or nearly three-quarters of a mile—of beams would be required for the wall-structure without taking account of the roofs.

¹¹ On this subject see page 74 below.

For this date rather than 61 see Syme, Tacitus (O.U.P., 1958) II, 765.

¹³ See Antiq. Journ. XXXVII, 217.

¹⁴ cf. the timber-framed house below the London Gate, R.E.M. and T. V. Wheeler, Verulanium—a Belgic and Two Roman Cities, (Soc. Antiq. Lond., 1936) (hereafter quoted as Wheeler, Verulanium) pls. xxii, lxxxvii, b.



Fig. 3

VERULAMIUM --- THEN AND NOW

to time, probably owing to the decay of sleeper-beams in the damp soil. In all, four major phases of reconstruction were identified in the second period and have been dated on the evidence of coarse and samian ware at c. A.D. 75/80, 100, 125, and 150; and meanwhile the floor-levels rose as new floors were successively laid down. The wooden colonnade beside the Watling Street with its covered shoppers' walk was maintained (Fig. 6). In other Insulae (III, XXVIII) free-standing timber-framed houses and shops were erected: the temple in Insula XVI was surrounded by a wall, and the Triangular Temple (Insula VII) was built. There is little evidence for any domestic flint-and-mortar buildings being put up until c. A.D. 160. Public buildings apart, for the first century of its existence Verulamium was a city of timber-framed houses; and this was true of the majority of others in south-east Britain too, at least for most of that period: they relied on local materials and fought shy of the expense of bricks and flints and mortar. In archaeological terms this means a rapid build-up of stratified levels.

This second period came to an end c. A.D. 155, when a great fire swept the forum area; sporadic traces of it were found also in the southern area excavated by Wheeler. The Forum itself was badly damaged and so almost certainly was the Macellum in Insula XVII. No cause can be ascribed with conviction: chance fires did immense damage to wooden cities.¹⁵ But at this period Verulamium seems to have been undefended, and the action of rebels cannot be ruled out, for the date well agrees with known disturbances in the north.

Once again reconstruction had to be undertaken, but this time a radical change was introduced. The new buildings were all of masonry, or at least their foundations were of flint and mortar, and tessellated and mosaic floors now appear for the first time. The Forum was not only reconstructed but two large temples were added to its back; the Theatre was now built on a site which had probably been the assembly area of the temple precinct, and it is therefore best considered as a sacred edifice dedicated to religious rites and assemblages; it was connected with the Forum by a newly-constructed street running obliquely across Insula XIV/XXVIII. The Macellum was rebuilt on a smaller more massive scale. A large main drain in stone was now constructed to replace an earlier timber-lined one on the north side of the Forum to conduct the waters collected on its roof to the river: the new sewer crossed the street to avoid the basilica 16 and was found to be of one build with a large new house in Insula XXVIII (building 1). A new though narrow street accompanied this sewer on that part of its course which lies between Watling Street and the river Ver. Clearly the Antonine Age was a period of wealth and confident investment (Fig. 4).

¹⁵ cf. Seneca on the fire of Lyon in A.D. 64, Ep. 91.

¹⁶ See Antig. Journ. XLI, 79-80.

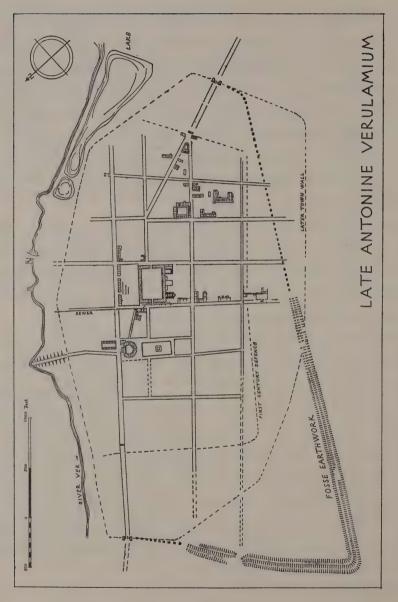


Fig. 4

VERULAMIUM -- THEN AND NOW

It is now for the first time that we can recognise the town-houses of the wealthy decurion class. There is so far no trace of any large houses in timber suitable for this class during the first century of the town's existence; and this is curious when we consider the historical facts as stated by Tacitus¹⁷ and the deductions of Rivet concerning the growth of the villa. 18 Both approaches would make us suppose that the leaders of the civitates were taking up town life with keenness: but if their villas were small and unpretentious, so also it seems were their townhouses.¹⁹ It is only after c. A.D. 160 that cautious reserve is abandoned, and the city adorned with houses of the finest and costliest kind.

It is probably to this period that the Fosse earthwork should be assigned. The original dating evidence was imprecise in that it gave only a terminus post quem, and now that the smaller circuit of the '1955 Ditch'²⁰ has been shown to give us the outline of the first-century town, the Fosse falls into place as a later feature. Moreover the layers labelled 'Additions 1-4' etc. in the original account²¹ are perhaps best taken as integral original layers of the bank, for they make little improvement in height or solidity as additions, and it is difficult to see how or why they can have been added; and this is especially so now that it is virtually certain that this defensive circuit was never completed, for more than one structural phase would thus be inexplicable. But if these layers are contemporary parts of the bank they help us to assess its date, for they contained pottery down to the Antonine period.22

Verulamium would not be alone in possessing earth defences provided c. A.D. 160. Indeed a majority of the towns in the south and west of Britain appear to do so, as is suggested in a recent study by Mr. J. S. Wacher.²³ A context can probably be provided, he suggests, in the troubled state of the frontiers at this time. What is unparalleled at present is the unfinished state of these defences at Verulamium (Fig. 4). They can be traced round the north and west sides of the city as far as Bluehouse Hill, but do not appear to have been carried further south, unless indeed a detached piece was under construction near the London Gate. This Gate, and its sister the Chester Gate, with their double foot- and carriage-ways and semicircular towers are of an early type of plan,²⁴ and the latter at least is on the line of the Fosse Bank. They may be compared with the somewhat similarly planned

Rivet, Town and Country in Roman Britain (1958), 113 f.

21 Wheeler, Verulamium, pl. xviii.

22 ibid. pp. 51 - 2.

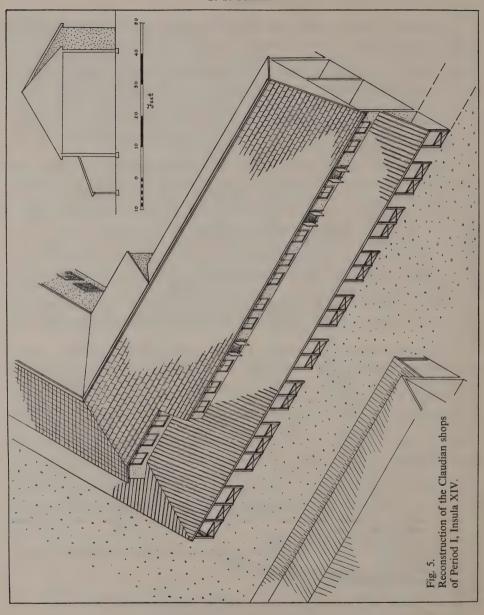
Tacitus Agricola, 21 . . . hortari privatim, adiuvare publice, ut templa fora domos extruerent . . . paulatimque discessum ad . . , conviviorum elegantiam.

¹⁹ See Insula III buildings A and B (Wheeler, Verulamium, pl. xxviii) and Insula XXVIII buildings 3 and 3a, (Antia. Journ. XXXIX, 14–15).

Antiq. Journ. XL, 3, fig. 1; see also figs. 2 and 3 above.

²³ I am grateful to Mr. Wacher for showing me this in advance of publication in Arch. Journ. CXIX

²⁴ cf. the early gates at Nîmes, Arles and Autun: Grenier, Manuel V (1931), chap. 8.



VERULAMIUM -- THEN AND NOW

gateway at Corinium²⁵ which has been shown to be contemporary not with the city wall there but with a pre-existing earth bank. A similar sequence seems to exist at the East Gate of Roman Lincoln, 26 and may be found to do so at Silchester also (a suggestion I owe to Professor I. A. Richmond). Furthermore the plan of these two gates at Verulamium contrasts with that of the city's 'Silchester Gate', through the town-wall on the west, where that wall is well clear of the Fosse, and where in consequence there can be no doubt that wall and gate are contemporary. If it is suggested that these two gates go with the earth defences planned and partly carried out c. A.D. 160, the suggestion is strengthened by the observation that in each case the gateways are structurally earlier than the adjacent city wall, which abuts them but is not bonded.27

This casual attitude towards the completion of these defences was corrected less than half a century later, when the town-wall was built on a rather different circuit but one which made use of the two already existing gate-structures (Fig. 1). The discovery of an Antonine masonry house²⁸ on the south-west edge of the walled area in a position where it must have been destroyed by the earth bank behind the new wall calls attention to the absence of any previous earthwork defence along the river-side except in the area of the fort; and the section cut in 1961²⁹ confirmed this. Neither the first-century municipium defences nor the Fosse Bank were carried along this front; the marshy flood-plain was evidently considered a sufficient barrier. The new town-wall, however, was carried completely round the city, and it was probably at this time too, that Triumphal Arches were erected at each end of Watling Street to mark the limits of the original municipium.

The date of the Wall is undoubtedly not earlier than c. A.D. 170-180,³⁰ and is probably to be put at c. 200. It was certainly in existence by c. 235. 31 What is not so certain is whether the solid projecting towers are contemporary. At the time they were excavated this was not realized to be a problem; but Corder³² has shown that such 'bastions' are normally to be dated c. A.D. 360, and that their addition usually compelled the plugging or filling-in of the original ditch, and the construction of a new one further out, usually considerably wider. The visible ²⁵ Antiq. Journ. XLI, pp. 64–65 and fig. 1.

J.R.S. L, 221 with fig. 22.

Wheeler, Verulamium, pl. lxxxvi, lxxxvii b (notice the differing building levels of wall and gate) and lxxxviii b; see also an unpublished photo in the Institute Library of the Chester Gate from a different direction.
 Partly excavated 1960 in the Insula north-east of VIII; perhaps the same building as marked on the 1941 plan

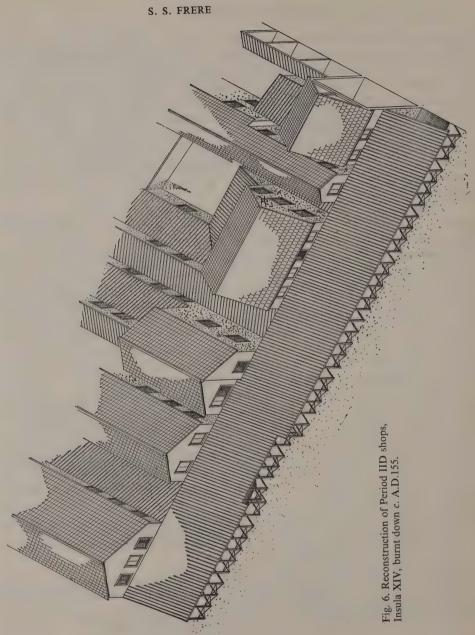
from air-photographs, Corder, Antiquity XV (1941), pl. facing 113.

²⁰ Antig. Journ. XLII, 150.

For the revised estimate of the date of the Wall see Antiq. Journ. XXXVI, 5-6.

31 'Certainly' may be too strong a word; the evidence depends on a coin hoard (Wheeler, Verulamium, 62) ending with one of A.D. 227-9, but the hoard consisted of only 5 coins, and is oddly composed. Nevertheless such coins were increasingly less available after the middle of the third century.

⁸² Arch. Journ. CXII, 41, modified by subsequent evidence from the relevant coins at Great Casterton. See Corder, P., The Roman Town and Villa at Great Casterton, Rutland III (Nottingham, 1961), 27.



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ditch at Verulamium approaches a width of 100 feet, and would be acceptable as of fourth-century date: but the 'bastions' appear to be bonded into the wall. This however need not be decisive, since in flint-and-mortar rubble it is easy to achieve. Wheeler's section C-D³³ appears to show the truncated bottom of what may be an earlier ditch, and his excavation of one of the internal wall-towers produced a late coin of Constantine I from the rubble; but this can hardly be called decisive since the tower in question appears to have collapsed at least 50 years earlier. Nevertheless it may hint at fourth-century alterations to the towers involving the replacement of the internal by projecting external ones. Internal towers are known at Canterbury, Aldborough, Caistor-by-Yarmouth and Alchester, but in no case is it certain that the fourth-century addition of external towers involved the suppression of their internal counterparts, as would be the implication here.

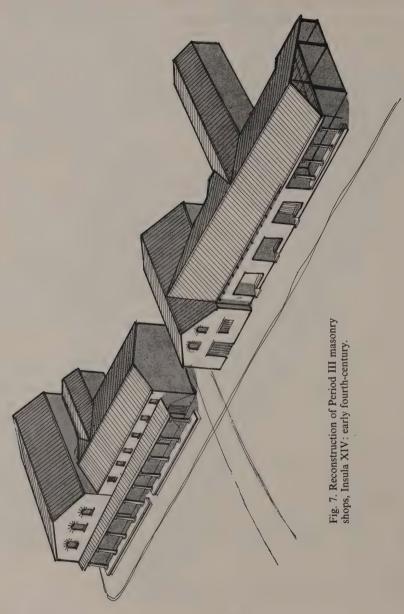
One further point should be made. A coin-hoard of c. A.D. 275 found over the ruins of its wall proved the collapse of the eastern internal tower by that date,³⁴ but there was nothing to prove that the western or corner tower had collapsed contemporaneously: it could only be shown that the ruin of both towers was earlier than early mediaeval robbing. But the tower with the hoard had been built over made ground (which may or may not be another portion of the incomplete Fosse Ditch, for it aligns with it): it is clear from Verulamium plate LXXXIII a that its builders had had trouble with it actually during construction. It had every reason for early and individual collapse. A due consideration for these facts prevents us accepting Collingwood's far-reaching deduction from them, that by about A.D. 275 the city-walls of Verulamium were largely ruinous.³⁵

This deduction was part of a general thesis, ultimately derived from Rostovtzeff, concerning the decay of urban life during the third century. The insular character of Britain, however, enabled its provinces to avoid the worst physical ravages of that age whether caused by barbarian invasion or by the oppression of measures taken to counter them, while on the economic side the collapse of the currency was not an unduly prolonged phenomenon. The archaeological indications cited in support were almost wholly derived from Verulamium and will not stand up to examination. They eventually derive from the observation that no new buildings can be certainly ascribed to the first nine decades of the third century, and that at the end of it extensive renovations took place, the famous 'Constantian renaissance'. This observation is certainly correct: but the deduction from it that by the reign of Carausius Verulamium 'must at this time have borne some resemblance to a bombarded city' is far less secure. The Theatre

⁸³ Verulamium, pl. xx.

⁸⁴ *ibid.*, 62.

⁸⁵ Collingwood and Myres, Roman Britain and the English Settlements (O.U.P. 1936), 202.



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by now, we are told, was largely ruined: 'long disused and demolished by service as a common quarry for the town'. ³⁶ Apart from noting that this is a contradiction in terms if no building was taking place at the time, we should remind ourselves that the report on the Theatre excavation ³⁷ contains little evidence to support the statement, though it is several times asserted therein. At the beginning of the fourth century the Theatre was extensively reconstructed, the intention being mainly to give more room for seating; many of the existing walls were retained. The idea that much of the structure had been *for some time* in collapse is difficult to substantiate on the evidence, for it was common Roman building practice to rebuild from the lowest courses when reconstruction had to be undertaken: but of such reconstruction there is surprisingly little in period IV of the Theatre.

Again, if an Empire-wide economic crisis was responsible for such a state of affairs at Verulamium it should certainly be discernible elsewhere in Roman Britain, as also should Constantian renaissances in other cities of the British provinces. But supporting evidence from elsewhere is very difficult to find.

The truth of the matter may well be less cosmic. The Antonine period like the Victorian had been one of expansion and of solid construction. By 200 Verulamium had been amply provided with flint-and-mortar houses with tile roofs. The rapid replacement of structures typical of the timber phase is no longer to be expected. Properly maintained, these new houses should easily last a century, and though their orderly replacement may have been somewhat delayed by the economic troubles of the last decades of the third century (with the result that many more were rebuilt c. 300 than would normally have been expected) there is little reason to suppose them ruinous at the time. Indeed the condition of the wall-paintings in building XXI 2, which owe their preservation to the demolition of the clay upper walls of part of the structure at this time, proves that in this case at least the roofs were perfectly sound till the end; and building XXVIII, 1 also seems to have continued right through till the 60's of the fourth century virtually unaltered.

In much the same way the numerous new houses built in the first decade of the fourth century when confidence had been re-established must have rendered it largely unnecessary to rebuild again before the end of that century; and the absence of such new structures need not by itself betoken early decay. But we now know that they are not altogether absent, for on two vacant sites (XIV, 3 and XXVII, 2) buildings were erected³⁸—one of them a large and palatial mansion—as late as c. 370.

³⁶ ibid

⁸⁷ Archaeologia, LXXXIV.

⁸⁸ Antiq. Journ. XXXVIII 8; XL, 19.

The main evidence, however, apart from the absence of structures, which led Wheeler to postulate an early decay of fourth-century urban life was the small total of contemporary coinage recovered in the area he examined. The coin list in Verulamium pp. 229-39 records the coins found in the southern part of the town and in the defences but excludes those from the Theatre, Forum, etc. The total is 1707 coins, of which 303 belong to the fourth century (17.75%). But of these, 67 came from the triangular temple³⁹ where special conditions may have obtained. If these coins are deducted from both totals the proportion of fourth-century coins becomes 14.39%. But in the area of my own excavations, where occupation has been shown to continue throughout the century, the proportion is not greatly different. It should be emphasised that the figures given here are provisional only, since not all the excavated coins have yet been cleaned and identified. Two rather exceptional areas produced unusually large quantities of fourth-century coins. One was the bed of the Ver outside the city wall where numerous finds suggested losses from a bridge, perhaps partly votive in character; the other was the cellar in building XXVIII, 1. If the coins from these two sites are included, the fourth century percentage reaches the high figure of 33.37%; but if they are deducted it sinks to 20.97%. Omitting the coins from the exceptional areas in each case, the 1930-34 total of fourth-century coins is 236: that of 1955-59 is 285.

A difference of 6.58% between a mainly residential and a mainly business quarter is not very startling; the shortage of coins especially at the end of the century is constant and striking (1930–34 1.52%: 1955–59 1.79%) whether due to the disturbance of the upper levels by agriculture (particularly heavy once the valley floor is left) or to a genuine shortage either overall or through increased use of gold and silver, 40 of which greater care was taken. Alone it need not be taken to indicate decay.

Nothing is known of the fate of the Forum. In the Theatre period IV Å was dated later than a coin of A.D. 345-61. At some later stage still the Theatre was used as a rubbish dump, but the coins contained in the earliest level of this deposit, which itself must represent the accumulation of some decades, include Theodosian issues; and the disuse of the structure as a Theatre cannot safely be put earlier than c. A.D. 380-90, ⁴¹ and may be later. ⁴² Formerly the Theatre's fate was taken to illustrate urban collapse, though the origin of the organic rubbish and its content of over 2300 coins was puzzling; but the subsequent discovery of the adjacent

³⁹ Wheeler, Verulamium, 29. Here he gives the fourth-century total as 196: I have preferred to follow the coin list. ⁴⁰ See Kent, J. P. C., From Roman Britain to Saxon England in R. H. M. Dolley (ed.), Anglo-Saxon Coins, 2.

Collingwood op. cit. (foot-note 35 page 67 above), 206, dated it to before the middle of the fourth century.
 The report (Archaeologia LXXXIV, 240) unfortunately gives no details of the five coins of the 'House of Theolosius' from this layer, though earlier we are told that coins of Arcadius and Honorius occurred in the deposit as a whole.

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market-hall—which though much disturbed in its upper levels produced two coins of Magnus Maximus⁴³ (383–88)—led Professor Richmond to suggest that the rubbish tipped was the periodic sweepings of the hall. Once it has been accepted that the Theatre was an adjunct of the nearby Temple,⁴⁴ it is possible to conjecture a religious rather than an economic reason for the Theatre's disuse, since the last decades of the fourth century saw a great spread of Christianity in Britain.⁴⁵ It was both official and intolerant. Less than two generations later, on the occasion of St. Germanus' visit in 429, there is no hint that any pagans are left.

A. W. G. Lowther's excavation of the Temple⁴⁶ (Insula XVI) showed that c. A.D. 390–400 a reorganisation took place involving the reversal of the entrance, which was moved to the west end of the temenos. It may be suggested that this was the occasion of the closure of the Theatre, whether or not the Temple-alterations imply its conversion to a Christian church. In view of recent imperial edicts⁴⁷ it would seem unlikely, though not impossible, that a pagan cult could continue to exist—and carry out building operations—within a major city. The alteration dates to a time when Britain was once again under the control of the Central Government (c. 395–406), or, if later than 406, still to a period when Christian control of the government was becoming ever more pronounced as it came into more local hands. Yet it remains curiously true, despite the ample documentary evidence, that no single specifically Christian object has yet been recovered from the soil of Verulamium.

The evidence for a continuing population at Verulamium in the fifth century, and one well steeped in the urban traditions of the past, is attested not only by the account of St. Germanus' visit⁴⁸ but also by the archaeological discoveries in Insula XXVII.⁴⁹ Here the late fourth-century house XXVII, 2 after several successive constructional phases, was demolished to make room for a large hall of unknown purpose, whose bonding course of tile consisted wholly of re-used broken pieces. This hall in turn gave place in due course to a pipe-line or wooden water-main, the chief interest of which lies in its physical and metaphysical implications: on the one hand a still-functioning aqueduct and the still-present

⁴³ Archaeologia XC, 89.

⁴⁴ See above page 61, and Antiq. Journ. XL, 12-16.

⁴⁵ The evidence is almost entirely literary. See Chadwick, N. K., Studies in Early British History (1954), 199 ff.; Myres, 'Pelagius and the end of Roman rule in Britain', J.R.S. L, 21-36.

Antiq. Journ. XVII, 28-38.

⁴⁷ e.g. Codex Theodos. XVI, 10, 13: 'We decree that no person shall have the right to approach any shrine or temple whatever or to perform abominable sacrifices at any place or time whatever . . .' dated 7 August 395, and other earlier and later edicts in this section.

⁴⁸ Though we are not specifically told that he visited Verulamium, or that the meeting with the Pelagians took place there, it is a safe deduction from his recorded visit to Alban's shrine, which even Gildas knew to be at Verulamium.

⁴⁹ Antiq. Journ. XL, 19-21.

engineering and carpentry skills attested by the pipes, and on the other hand the demand for clean piped water, and the habits of life therein implicit. Dark-age Verulamium still retained its Roman traditions. The dating of this sequence depended upon superimposition: no coins were found. But this, in view of Dr. Kent's recent demonstration⁵⁰ that both silver and copper coinage ceased to circulate c. 430, is not surprising. It raises the question how late other structures lasted where superimposition did not take place.

The second phase of Building XXVII, 2 dating as it must do to c. 390 or 400, was one of some magnificence. One room already possessed a very competent mosaic; now two other rooms were doubled in size and provided with very large mosaics. Recently comparable evidence for very late fourth-century urban magnificence was found at Cirencester.⁵¹ These were the homes of wealthy men, the families of a Pelagius or a Gratian.⁵² It was to the occupants of such houses that Honorius' rescript came. Thereafter, in the third phase, one of these luxurious rooms was sacrificed to house a corn-drying furnace: we infer that barbarian or peasant disturbances were making the countryside unsafe. In this period the town walls, which in most cases had been brought up-to-date with ballista-towers only half a century before, provided the safety behind which urban society could find security and maintain its traditions: there must have been a gradual drift from the villas on the part of the rich.

What of the end? At Canterbury we found evidence for massed settlement of barbarian soldiery within the walls, whether as allies or conquerors, about 450. Allies seems most likely, for at first they were settled in orderly fashion round an empty insula; barbarians on their own are likely to have shunned the cities. Comparable evidence comes from Silchester.⁵³ At Verulamium so far there is nothing of this phase to show, but only 20 out of 200 acres have been dug. It is unlikely that a city as prominent as Verulamium would have lacked such mercenaries by 450, but their presence or absence can have made little difference by then. Canterbury survived, but now as a Saxon city: Cirencester survived as a British centre. But Verulamium lay too far east for security and is today deserted. When did this occur? Did its life run down in the insecurity of the later fifth century with the death of trade, and when even the food-supply was insecure? Or did it gain new life from the turn of the Saxon tide at Mons Badonicus in 486?⁵⁴ Did it survive

Kent, op. cit. (foot-note 40, page 70 above), 5.

Rather inadequately noted in J.R.S. XLIX, 127.
For the background of Pelagius see J.R.S. L, 22, with note 9; for Gratian, a municeps, see ibid., 32, note 77; also C. E. Stevens, Athenaeum (Pavia) XXXV (1957), 322.

⁵³ See Boon, G. C., Medieval Archaeology III, 79–88.

For this date see Hawkes, C. F. C., in D. B. Harden (ed.), Dark Age Britain (1956), 95.

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to form the nucleus of the British kingdom of the Chilterns which was destroyed in 571? We may never know, now that the uppermost levels have been ploughed away, and in the absence of datable finds. Nevertheless already once a pessimistically early view about the end has been shown to err. The absence of Saxon cemeteries in the Verulamium region is a significant fact, and this absence applies to cemeteries used in the sixth as well as those of the fifth century. Fifth-century cemeteries are known at Sandy and Luton; by the early sixth century burials were appearing in the Aylesbury region. None of these are closer to Verulamium than the Icknield Way. The earliest Saxon interments nearer than this are probably the two late sixth-century burials at King's Walden.

All this is quite consistent with, and almost demands, the preservation of some sort of *territorium* round Verulamium till the end of the fifty years of peace which followed Mount Badon. On the other hand, the local disappearance of the cult of St. Alban by the time of Offa (793) must mean that by then the continuity was broken. Some time perhaps soon after 571 the end must have come. In that year the Anglo-Saxon Chronicle records that Cuthwulf fought with Britons at Bedcanford and took four towns, Aylesbury, Limbury, Bensington and Eynsham. This battle saw the collapse of the frontier, if it did not result in the immediate over-running of the territory of Verulamium.⁵⁵

This paper began with the intention of discussing the importance of Verulamium in Roman Britain and its importance now. The second part of this programme is now apparent: whatever the importance of the city then, its availability for excavation and the circumstances which have enabled two large areas to be examined in the last 32 years have given us a coherent picture of the history of a Romano-British city, which with minor variations of interpretation can be accepted. In the course of the discussion some hints of the importance of Verulamium in its contemporary setting have emerged. That it became a municipium in the reign of Claudius there can be little doubt, and to that extent it is exceptional in Britain. It also became in course of time exceptionally large, in area the third city of the province. The Catuvellaunian civitas itself occupied an exceptionally large area, but the precise arrangements of local government therein are obscure. A municipium with its territorium might be carved out of the tribal area, the remnant being given another centre, for instance Braughing; or else the civitas might be attributed to the municipium, in which case it would be governed there-from; or finally the civitas might be suppressed altogether. That the last at least was not the case here is suggested by an inscription probably of c. A.D. 369 from Hadrian's Wall⁵⁶ mentioning the civitas Catuvellaunorum, and by

⁸⁶ C.I.L. VII, no. 863.

⁵⁵ See Myres, Roman Britain and the English Settlements, 424: Stenton, Anglo Saxon England, 27.

the earlier tombstone from South Shields of Regina, natione Catvallauna.⁵⁷ Only the discovery of further inscriptions can tell us more.

The evidence that Verulamium was a municipium is strong. It derives primarily from a statement of Tacitus⁵⁸ when describing the sack by Boudicca first of Colchester, then of London—cognomento quidem coloniae non insigne—and finally of Verulamium: eadem clades municipio Verulamio fuit. Accepted by Haverfield, the validity of this evidence was later undermined by the suggestion that the term municipium is loosely used to mean just 'town'. But Syme⁵⁹ has shown that the contrast of municipium with colonia in the passage in question proves that a technical meaning is attached. He describes it as a 'precious fact'. The fact is supported (i) by Dio, who in his description of the Boudiccan rebellion tells us of the sack of δύο πόλεις: 60 later he calls them πόλεις δύο 'Ρωμαικάς. 61 But Tacitus describes the sack of three towns, Colchester, Verulamium and London: the last he tells us was not a colonia. (In the context it cannot have been a municipium either: with no legal status it must have ranked at the time as a vicus.) The two Roman cities of Dio are therefore Colchester and Verulamium. They are Roman because one was a colonia, the other a municipium.

(ii) The Antonine Itinerary and the Ravenna Cosmography naming British cities give the tribal capitals their formal double names (Calleva Atrebatum, Ratae Coritanorum etc.) but Verulamium appears as plain Verulamium, as it would do if it had a status of its own.

The early grant of municipal status might suggest a greater degree of Romanization in the early phase of Verulamium than elsewhere; on the other hand, the purpose of the grant may have been different altogether, a political grant to an important tribe (in return for no more than normal progress in Romanization) to compensate for reduction in territory or to reward for alacrity in surrender. Claudius was a man of originality in administration, and we know too little of the politics of the conquest period.

Verulamium lay too close to London, which by the middle of the second century must have begun to overshadow it in prosperity and importance. It is unlikely for this reason that Verulamium became the capital of one of the four fourthcentury provinces, convenient though such a theory would be in accounting for the Constantian renaissance. One of the effects of the Constitutio Antoniniana (212) must have been to level down the privileged status of the charter-towns of Roman

Ephemeris Epigraphica IV, no. 718a.

⁵⁸ Annales XIV, 33.
⁵⁹ Tacitus, (O.U.P., 1958) II, 764.

⁶⁰ Dio, LXII, 1.

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citizens. Even if the prosperity of London declined in the late fourth-century, it was still without doubt the seat of the Vicariate. 62 Verulamium was the seat of a bishopric, if analogy is any guide, but at present there is nothing to illuminate the bare supposition. Nor can the city with any justification claim to be the home of the British Emperor Gratian, municeps . . . tyrannus. 63 For as Myres has shown, 64 even if Verulamium were the only municipium in Britain, the term municeps by 406 had lost any technical sense it may once have possessed. Nevertheless the city three times impinges upon recorded British history, once under Boudicca, once when Alban was martyred, and once when it received Germanus.

It remains to answer the question posed on page 55; how far it is justifiable to deduce general provincial history from the history of one site? Now that the sharp curves of the original graph have been smoothed out, and the development of Verulamium shown to be a less alarming stagger, its story does broadly agree with that of other excavated sites. And there is the point that the question need no longer be asked, since it is no longer possible to attempt to trace the course of urbanisation in Britain from the history of a single site.

Most towns developed as early as opportunity arose in the Julio-Claudian period, once the conquest phase was over; all began as timber cities. All required government encouragement at first, and if indeed the appearance of masonry buildings marks a peak of effort and the start of spontaneous acceptance of urbanisation among the upper classes, Verulamium was slower to reach this peak than some, despite its status. 65 The Antonine period brought the city to a climax of confidence and of solid comfort. During the third century it rested tranquilly on its achievements: in other cities, e.g. Canterbury and Exeter the Antonine consolidation overflowed into the third century, and tranquility did not set in till later.

During the fourth century, as Richmond has shown, 66 the emphasis shifted; the cities of Britain were becoming less formal, less dependent upon the residence of the decurionate whose country villas now opened on a new period of magnificence: they became more spontaneous, more mercantile and industrial. Small manufacturing shops had indeed always been present. At Verulamium, for instance, the shops of Insula XIV had housed a bronze industry from the beginning. 67 and in the second century potters had worked in the region of Insula V. 68

⁶² And is recorded as the seat of a praepositus thesaurorum. Notitia Dignitatum Occ. XI, 37.

⁶³ Orosius, VII, 40, 4.

⁶⁴ J.R.S. L. 32, note 77. See also C.E. Stevens, 'Marcus, Gratian, Constantine', Athenaeum (Pavia) XXXV, 322.

⁶⁵ At Canterbury, for instance, the Butchery Lane House had been built by A. D. 100 (Arch. Cant. LXI, 1-45), and at Circnester stone buildings succeeded wooden ones about the time of Hadrian: Antig. Journ. XLII, 8.

⁶⁶ Roman Britain (Pelican, 1955), 98-104.

⁶⁷ Antiq. Journ. XXXIX, 4-8; XLI, 74-75.

⁶⁸ Wheeler, Verulamium, 111-12, 186-90 and pl. cxx; Antia, Journ, XXI, 271-98; XLI, 82,

In the early fourth century a new frontage of shops was built in Insula XIV along Watling Street, larger and more substantial in character, but lying so close to the surface that no trace remains to tell their wares (Fig. 7).

But if we are right in playing down the decay of the wealthy houses, the change in the character of the town may not have been as great as has been thought. The office of decurion was now hereditary by law, and it was not easy to evade one's civic duties. Real urban decay was the product of the fifth rather than the fourth century, and was the inevitable result of the gradual collapse of society itself. And even so, the end may have been long in coming.

The Teaching of Archaeological Conservation

by I. GEDYE AND H. W. M. HODGES

The scientific approach to the conservation of antiquities is a comparatively new study, no general treatise of any importance on the subject having appeared until the publication of H. J. Plenderlieth's Conservation of Antiquities and Works of Art in 1956, although the journal, Technical Studies in the Field of the Fine Arts, published in America, first appeared in 1932. The latter dealt principally with the treatment of pictures and it was only after the foundation of the International Institute for Conservation in 1950 that a journal covering the preservation of both antiquities and pictures appeared two years later. It is therefore hardly surprising that conservation as a subject of advanced study is not always clearly understood.

Before discussing the teaching of conservation, the difference between cleaning and conservation must first be fully appreciated. It is possible to 'clean' an object, especially one made of metal, without necessarily rendering it stable or free from further decay; and unless the causes of disfiguring surface-incrustations on antiquities are understood, the seeds of further attack may often be left behind in the body of the object. For instance, the incrustation on the surface of stone or pottery can be removed by appropriate acid treatment and the immediate result may seem perfectly satisfactory; but unless the soluble salts are thoroughly washed out they will crystallize or dissolve within the body of the object, according to the relative humidity of the housing conditions. If this state of affairs is allowed to go on long enough the surface will flake, and disintegration will be the final result. Similarily a bronze or iron object which has not been washed absolutely free from chlorides will, because of the formation of hydrochloric acid, in due course inevitably be etched away to become a pile of corrosion. In the first case the action is physical in the second chemical; but the result is the same: destruction.

The practice of conservation in archaeology can best be compared with that of medicine: in both examination of the symptoms is followed by diagnosis of the condition and treatment. Obviously, correct diagnosis is of the utmost importance, since without it the proper treatment cannot be prescribed. Today one expects of the medical profession an exhaustive preliminary training: yet there are still those who imagine that it is unnecessary for a conservator to have any understanding of the processes he is carrying out and that 'cleaning' can be done empirically

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on a 'cookery book' basis. In fact, just as the study of anatomy, physiology and pathology are essential to the doctor before he can hope to diagnose, so the study of the technology and chemistry of materials and the causes of decay are essential before a conservator can start to conserve. It is perhaps worthwhile to compare those aspects of training proper to a conservator and doctor

CONSERVATION MEDICINE Technology Anatomy (the structure of antiquities) Chemistry of materials Physiology Causes of decay or corrosion Pathology Diagnosis Diagnosis Treatment Treatment After care After care (housing and environment in the

(housing and occupational hazards)

Museum)

Just as the increased complexity of medical equipment and drugs has meant a more prolonged training period for doctors, so has the wide range of modern materials now available made a longer training period essential for conservation. In the past restorers had secrets which ranged from sand to camels' dung as reagents and a craftsman (provided he was not treating metal objects) using the simpler natural materials such as glues, wax and resin might work with little real knowledge of his materials. These were relatively adequate for a wide range of functions; but modern materials, euphemously known as plastics, although each far more effective when used in the right place have a much more restricted field of application. It thus becomes imperative to understand the limitations of these materials. For instance, in casting, it is possible to take a mould from a copper or bronze object using butadiene copolymer; but if a natural latex is used the mould will fail to set owing to the formation of cuprammonium. This type of restriction, due to chemical properties, can be repeated for virtually every single modern material in common use in conservation. The teaching programme in the department, because of these complexities, has to be far more comprehensive than might at first sight appear.

For the purpose of conservation 'technology' is not envisaged as the history of technology. It is a study of the materials available to early man and the methods he used to work them, as well as the inter-reaction of materials and techniques. Part of the course is devoted to pottery making and to some aspects of metal working. Few students have any previous knowledge of craft processes and those

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who have taken courses away from the Institute in such subjects as ceramics find that to use prepared clays, electric wheels and commercially formulated glazes, teaches them next to nothing about making pottery from the raw materials using relatively primitive techniques. In connection with this course students attend the Environmental Department's course on natural raw materials as used by early man (Quaternary Geology I).

For chemistry and physics the requirement is similar to that of the School Leaving Certificate, but from the start the emphasis is put on the aspects of these subjects that are vital to conservation. Thus silicon and the silicates are given far more emphasis than in any school text-book, while the commercial production methods of most compounds are omitted. The course is thus more than a revision of those things learnt at school. The basic chemistry and physics course is followed by a course aiming to cover very limited fields of a wide variety of sciences as follows:-

Botany: The structure of wood (but not its identification) and of those plant

fibres used in textiles.

Zoology: The structure of skin, connective tissue and bone.

Chemistry: A survey of the commoner organic compounds, especially polymers;

the simpler spot tests for radicals; and some aspects of metallography.

Physics: The behaviour of light, radiography and ultra-violet (including some practice in the use of both) and simple circuit electricity.

The aim is to familiarise the student with the fundamental techniques of examining artifacts from a material point of view.

In the conservation course the treatment of a wide range of materials is taught and in every case is related both to the chemistry involved and to the structure of the particular material. In addition some instruction is given on the proper environment for antiquities, including the damage which can be caused by light, humidity and pests; the classification of adhesives and consolidants; and the keeping of proper laboratory records. The last activity is of greater importance than is sometimes realised; it is a common experience that objects arrive in the department for further treatment which would be greatly expedited if one only knew what had been done to them in the past. First aid for antiquities in the field is also dealt with, the emphasis being always on the need to consider the future treatment of the object in the laboratory. Here also a proper understanding of the limitations and potentialities of the many modern materials available is essential. After the fundamentals of conservation have been acquired, the course takes the form of seminars for the discussion of current trends and such subjects as the structural and conservation problems posed by materials of various kinds.

Advanced students also take a course in the technology of paintings and

painting materials and the general care of pictures, the purpose of which is not to turn them out as picture restorers, but to give them some idea of the problems involved and to equip them to undertake the routine care of pictures not involving the use of solvents, should they find themselves in a position of having to do this.

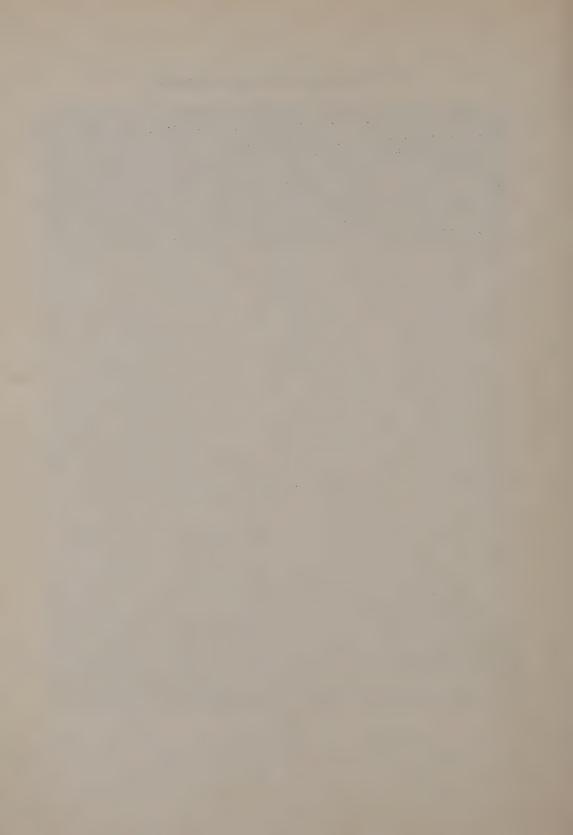
Practical work is an important part of the curriculum, both for developing manual dexterity, which only comes with constant practice, and to provide experience on as wide a range as possible of conservation problems. The corrosion products on metal objects vary according to the conditions of burial and the climatic changes they may have undergone during burial. Objects buried in contact with a corpse or dropped on a habitation site suffer more than those lost away from dwellings owing to the greater local concentration of chlorides: while bronze finds from waterlogged environments are generally in comparatively good condition. Stratified layers of corrosion products can be caused by successive dry and wet periods during burial. For these and similar reasons two metal objects rarely react in exactly the same way under similar treatments; and it is imperative therefore that the students should handle as wide a range of materials as possible, with a correspondingly wide variety of problems. It is of no educational value for the student to treat several hundred pieces of corroded iron, for example, all posing the same problem, the production of a recognisable shape from an amorphous lump of rust. This is only one aspect of an activity which covers the problems of physical and chemical decay in the wide range of inorganic and organic materials used by man in the past: metals, glass, pottery, wood, leather, fabrics; and the aim is to confront the student with as many examples of these phenomena as archaeological expeditions and museum collections can produce.

A grounding in casting techniques is of growing importance in conservation work. Earlier in the century most museums could at small cost get casts and electrotypes made by commercial concerns. This is no longer the case, for not only is it difficult today to find experts capable of turning out reproductions to the required standard, but it has become a very expensive matter under present economic conditions. As a result many museums now expect such reproduction work to be done by their conservation departments, and this has the obvious advantage that at least materials will be selected for preparing the moulds that will not damage the object, a consideration not always foremost in the mind of the commercial caster. Today there is on the market a wide variety of newly developed casting materials. As has been pointed out already these vary considerably in their properties and the student must learn which materials are applicable to which situations. Here again experience in dealing with a wide range of objects is vital to the students' understanding of the work.

As was said at the beginning of this article, the development of conservation

THE TEACHING OF ARCHAEOLOGICAL CONSERVATION

as a subject of systematic study is a relatively recent phenomenon. Realisation of its growing importance is to be seen in the establishment in this country of technical centres, one of whose functions it will be to help and advise museums on a regional basis in the treatment of objects in their care. It is certain that its techniques are capable of further extension; but the advent of new materials and appliances will make further demands on student and instructor alike. The lengthening of the course from two to three years is a possibility that may yet have to be faced as a matter of internal teaching in the Institute itself; other academic problems may well present themselves and may call for further consideration in due course.



Excavations in the Lake Group of Barrows, Wilsford, Wiltshire, in 1959

By W. F. GRIMES

INTRODUCTION

The excavation here described was undertaken in June-July, 1959 as part of the Institute's first field course. Colt-Hoare gave the Lake Group as a whole its name. He also numbered it; but there is some discrepancy in the plans by which the barrows are illustrated in *Ancient Wiltshire*.¹ The 'Map of Stonehenge and its Environs' shows 23 barrows in the Group plus three outliers to the north west. The pictorial map of the Group itself shows only 20 (plus *four* outliers, 21-24); and the variation affects the numbering of the barrows, here described, the general map showing seven mounds where the detailed plan has four. In terms of Hoare's numbering, Barrows 2, 3, 4, and 5 are the concern of this account; but there is a mound between 3 and 4 not numbered by him; as well as an unsuspected ring-ditch which was found to impinge on both 4 and 4a appears as 4b. Finally a very small mound lying away from the rest to the south was not numbered by Hoare, though it figures with others on this map. In this account the system of Goddard as modified by Mr. Grinsell has been adopted in an effort to avoid further confusion; but changes have been necessary to allow for additions.²

The immediate reason for the excavation was the fact that the barrows were under imminent threat of ploughing for the first time after many years; the work was done therefore as a rescue-excavation under the aegis of the Ministry of Works, which made a grant towards the expenses and also provided a good deal of equipment

Colt Hoare, Sir R. The Ancient History of South Wiltshire (1812), 209-213 (for the description of the barrows, with the 'Map of Stonehenge and its Environs' between 170 and 171, the detailed plan facing 207 and plates (xxx and xxxi) illustrating objects facing 210 and 212 respectively. Stukeley (Stukeley, W., Stonehenge, a Temple restored to the Druids (1740), Tab. XXXI (facing 60) gives a view of the Lake Barrows which in relation to the western members of the group is consistent with Colt Hoare's Stonehenge map. Both agree in showing a second small barrow near No. 36g as numbered in the present account. This barrow was not recognisable in 1959, but if reduced to the same degree as No. 25 might still have existed in the ungrazed vegetation which covered this part of the area. It should perhaps be added that no attempt has been made to check the accuracy of presentation of the Lake Group as a whole

The Lake Group of Barrows: previous finds

The Lake Group as a whole occupies a more or less level ridge, not sharply defined, between broad shelving valleys which deepen and narrow as they dip south-eastwards towards the River Avon at Lake (Fig. 1). As a whole they are 350–370 feet above sea-level (six-inch O.S. Wilts. 60NW: an approximate NGR reference is 417143 on Sheet 167 of the current one-inch map).³ Many of the barrows have been or are being ploughed or at least encroached upon by ploughing, but immediately to the east of the present series several mounds which include the long barrow, Colt-Hoare's No. 1, are within a beechwood. These retain something of their original dimensions and appearance at the cost of continuing damage to their internal structure by tree-roots.

Every one of the round barrows in the group has been opened in the past and Colt Hoare describes briefly what was known from them. He dug most of them himself; and from his or from the Reverend Edward Duke's excavations (of Barrows 16—20, in different ownership from the rest) came a number of discoveries which have an important place in the repertory of the Wessex Culture. This material has been fully dealt with by Professor Piggott⁴ and no useful purpose will be served by a further description of it. The range of finds from the group as a whole is such that every phase of the Bronze Age from beaker times onwards is represented.

Of the barrows described in this report the 'diminutive' No. 2(36f) produced from just under the surface the 'very rude and perfect little cup' whose flat per-

Goddard in Wilts. Arch. Mag. 38 (1913-14) 347-8, Grinsell, V. C. H. Wilts. I, i (1957) 197. The following is a concordance of the different series:-

	Colt Hoare 2	Goddard 36a	Grinsell 36f	Present paper 36f
	drama	skiralna	36g	36g
	3	37	37	37
	4	38	38	38
	*****	Granded .	6 17000	38a
_	_	-		38b
	5	39	39	39

Goddard refers to 'a group of 18 small barrows close together' although only two are shown on the O.S. map; Grinsell says 'about five' were visible in 1950. Their numbers, 36a-p and 36a-e reflect these statements; but the additional barrows do not seem to be recognisable in present conditions.

The Group is inadequately represented on the current maps: Barrow 36f is omitted as also is the other visible mound, 4a in the series here described. Other members of the Group to the north east are also not shown.

Piggott, S., 'The Early Bronze Age in Wessex', PPS IV (1938), 52-106. The finds from the barrows as a whole are conveniently listed by Mr. L. V. Grinsell in V. C. H. Wilts. I, i (1957), 198-9.

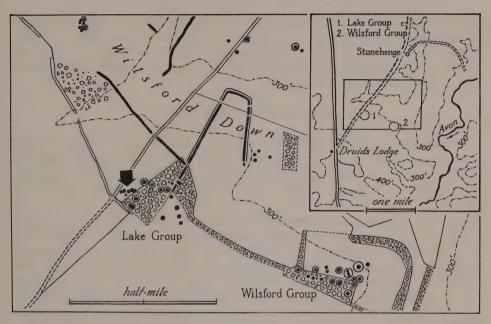


Fig. 1. Maps showing the location of the Lake Barrow group.

(The arrow indicates Barrows 36f-39, described in this report).

Based on the Ordnance Maps with the sanction of H.M. Stationary Office.

forated base (with pair of holes in the wall) Colt Hoare regarded as further justification for the use of the term 'incense cup'. The cup accompanied a burial of burnt bones. Barrows 3 and 4 (37, 38) had been opened by others. No. 5 (39) was investigated by Mr. Cunnington in 1805: he found in it an interment of burnt bones with 'twenty or thirty small black beads which appear to have been composed of earth or wood and to have passed the fire'—that is, beads of shale. It will be seen later that there is some inconsistency between these statements of what happened and what was actually found. The remaining mound, 38a, was not provided for in his numbering, as already observed, by Colt Hoare. The ring ditch, 38b was presumably not visible in any case.

Apart from the very small mound, No. 36g, which contained a rectangular very

6 Devizes Museum Catalogue I, No. 172b.

⁵ The cup is illustrated in 'Tumuli', Plate xxx referred to above, footnote 1. The same figures are used, much reduced, in the Devizes Museum Catalogue I (The Stourhead Collection) (1896), No. 172.

recent-looking pit, the barrows showed no sign of disturbance in 1959. The irregularities which would have resulted from the attention of the 19th-century barrow diggers had been smoothed out by ploughing. The absence of grazing by sheep and by a rabbit population much depleted at this time by myxomatosis had left them with a cover of relatively coarse turf.

THE EXCAVATION (Plan, Fig. 2)

Barrows 36f and 37

These barrows were superficially in contact, a line joining their centres orientated approximately east-west. Barrow 36f, on the west, was the smaller; about 28 feet in diameter and barely visible as a slight rise on the surface of the ground Barrow 37 had an apparent diameter of about 50 feet; it was somewhat over a foot high.

Barrow 36f was almost completely cleared to the inner edge of its encircling ditch, with staggered balks based on its estimated centre. The area enclosed by the ditch proved to be an irregular oval in plan, 27 ft. 6 ins. along its north-south axis 25 ft. 6 ins. east-west. The primary burial pit, found ultimately to underly the junction of the balks, was circular, 27 inches across and 7 inches deep. It contained a filling of brown earth and stones, with a few fragments of cremated bone. The pit had obviously been previously disturbed; but it is not clear that the pigmy cup referred to above came from it, for Colt Hoare describes the cup as having come from 'just under the surface'.⁷

In clearing the body of the mound the north-western quadrant was attacked first. Here and elsewhere the cover of humus was fairly constantly 6-9 inches thick. The body of the mound was chalk rubble with an admixture of dark soil in places: its maximum depth over the undisturbed solid chalk was about 9 inches. Too little of the structure had survived to allow any features to be recognisable in it.

The rubble was removed in two spits. Near the south side of the barrow-platform and towards its outer edge a human skull was exposed during the removal of the second spit. It was damaged on its upper side but apart from the thin facial bones appeared to be in good condition. As clearing continued it was seen to be lying on its right side, looking towards the west; and other parts of the skeleton in due course began to appear. There was no grave-pit: the body, that of a young male (below, p. 95) had been laid on the surface of the chalk in a strongly flexed position, with the legs bent tightly upwards (Plate X, 1). Some of the bones of the arms in particular had become displaced, no doubt as a result of movement and settlement after burial.

⁷ loc, cit., footnote 1 above, 209.

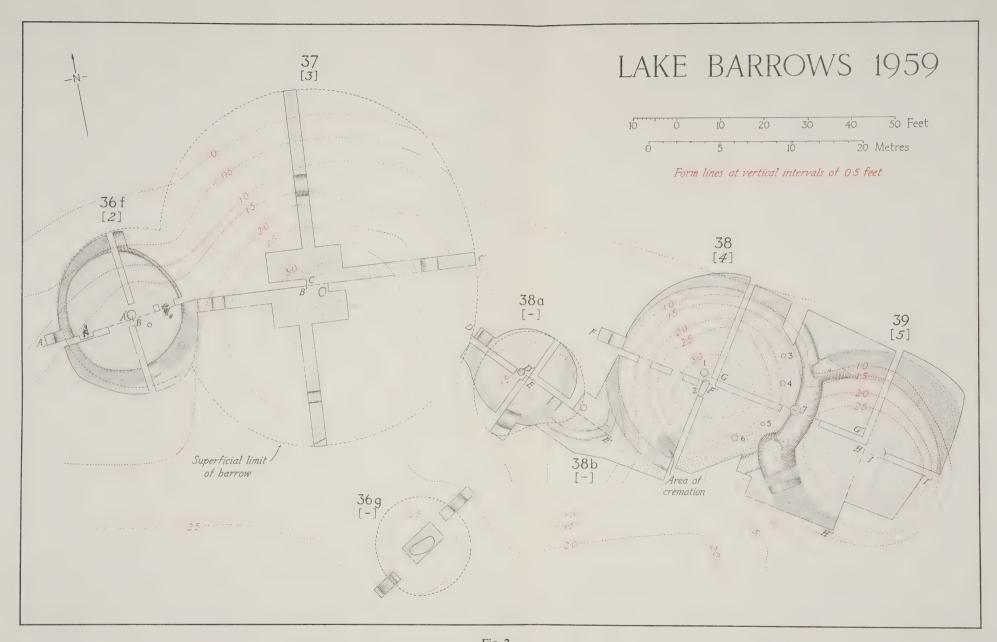


Fig. 2

(The barrows are numbered, with modifications, in accordance with Grinsell's list in V. C. H. Wilts, I, i, 198; the numbers in brackets are those of Colt Hoare).



The undisturbed chalk rubble of the mound encased the skull and covered the rest of the skeleton. It was clear that the body had been put down before the mound was constructed.

The excavation of the south-west quadrant also revealed featureless chalk rubble, with a well-defined inner edge to the ditch. A small circular hollow in the angle of the south-east quadrant produced a flake-scraper and a struck flake; but this and the north-east quadrant were featureless except for a second skeleton which extended beyond both sides of the balk separating the two quadrants.

This body also had been laid on the original surface before the mound was built. It balanced the western skeleton in its relationship with the primary cremation pit: the three lay in a straight line along the shorter east-to-west axis of the area within the barrow-ditch. The remains here represented two individuals: a young adult female and a small child. The woman had been laid down in a curiously contorted position, front downwards with head twisted over on its right side and looking eastwards (Plate X, 2). The arms were slightly akimbo but folded tightly upwards so that the forearms and hands were partly beneath the body. The legs, on the other hand, though not as compressed as with the first skeleton, were closely bent at the knee and lay to the west at something less than a right angle to the main axis of the body.

The remains of the child were slightly over 12 inches away from the skull of the adult to the south-east. The vault of the skull, in fragmentary condition, and a few very fragile rib-bones were all that had survived.

The whole of the area of the surface beneath the mound was thoroughly cleared when the balks had been cut back to reveal the cremation pit and the skeletons; but no further discoveries were made apart from the scattered finds referred to below. Around the pit pieces of cremated bone, human teeth and teeth of pig were found. The scatter of human remains may have been due to the disturbance of the primary burial.

The axial balks were extended beyond the edge of the barrow-platform in order to take in the ditch. The sections of the latter were completed along one or other of the faces and the section towards the east was extended to cross the ditch of Barrow 37 and merge with the main west-east section of that barrow (Fig. 3). The ditch of Barrow 36f proved to be slightly convex-sided and flat-bottomed, its inner lip more sharply defined than the outer. Its width varied between about 3 ft. 6 ins. and about 4 ft. 6 ins.; it was 2 ft. 6 ins. to 3 ft. deep. The lower part of the ditch where seen was filled with a very compact coarse chalk rubble. The upper filling was a finer rubble in a matrix of grey-brown soil. Apart from the sections the ditch was cleared only sufficiently to expose its margin. In the surface of the filling on the

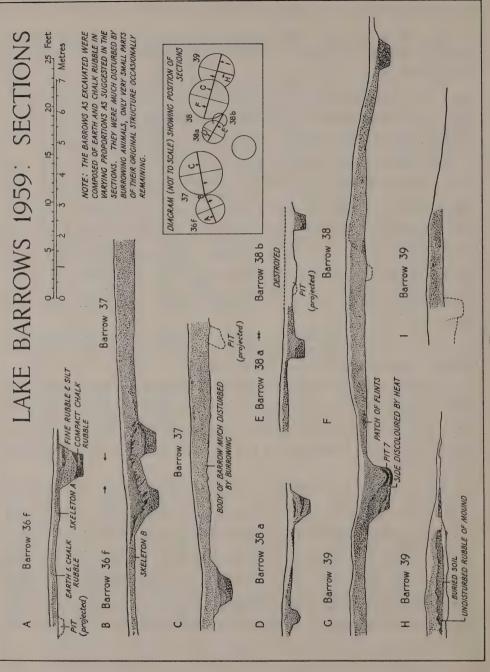


Fig. 3

south-east side there was a small hollow, producing charcoal and bones, which appeared to be a hearth. A curious feature of this area was a series of furrow-like marks (Plate X, 3) which penetrated the ditch-filling and for which no explanation has yet been forthcoming. More is said about them below (p. 120).

At their nearest points to one another the ditches of the two barrows were only 3 feet apart: but no doubt partly because of the 'furrows' just mentioned it is not possible to say from a study of the deposits which of the ditches was dug first. The 'furrows' extended across the full length of the section in the relevant area.

FINDS FROM BARROW 36f

(a) Preceding or contemporary with the structure

Good end-scraper of white patinated flint, slightly worked also along long edges. SE quadrant, from hollow in natural surface near inner angle. (Fig. 4, 1).

Elongated pointed-oval thick *flake*, a little cortex remaining, steeply worked down both long sides. The pronounced oblique point at one end appears to be accidental. SW quadrant, from chalk rubble forming body of barrow. (Fig. 4, 2).

Thin scraper, poorly worked along one convex edge. NW quadrant, from chalk rubble forming

body of barrow.

Series of small sherds of same general character apart from two decorated with fine corded lines probably from a Wessex B beaker; and some coarser fragments of Peterborough type. SE quadrant, from chalk rubble forming body of barrow.

(b) Associated with the barrow

Primary burial. From the central pit a few fragments of cremated bone (adult) with a scatter of fragments from the surrounding area, indeterminate. Also from the pit snail shells (Pomatias elegans, Hygramia sp.); and from the surrounding area remains of inhumation burial, female or young person (probably the former, owing to presence of one premolar tooth); unburnt pig teeth and fragment, unburnt, of deer metatarsal (I.W.C.).

A small quantity of cremated bone, probably human, also came from the area of the small hole in the SE quadrant, not a complete cremation. Associated were snail shells (Cepaea sp.) and remains

of large ox (Pm and M/p epiphysis) (I.W.C.)

THE SATELLITE BURIALS report by I. W. Cornwall

The most important and interesting finds were two inhumation-burials, both from Barrow 36f, one from the west side (A) and the other, a double burial, (B), from the east side. These were not only cleaned and lifted in the field, but painstakingly reconstructed and studied in the laboratory by Mrs. Laila Haglund-Calley under the writer's general supervision. The material has been reviewed at this date for the purpose of composing the final report, but the credit for the practical work and for the substance of the findings remains hers.

BURIAL A (West side)

The skeleton was reasonably well preserved, all parts being represented, though, as is usual in such cases, the axial skeleton and extremities were much decayed. The skull, mandible and most of the long bones could be strengthened and reconstructed, so that a reliable picture of the individual could be formed.

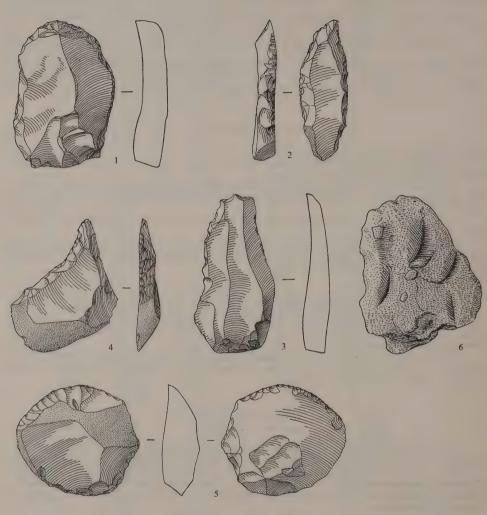


Fig. 4. Lake Barrow 36f: finds. $1-5 \left(\frac{2}{3}\right)$; 6 $\left(\frac{1}{1}\right)$.

It was immediately apparent, from the complete and well-preserved dentition and the unfused condition of the epiphyses of the long bones that we were dealing with a youthful subject, not fully grown and of slender proportions.

Skull. The skull was small in absolute dimensions, but with a fair thickness of bone, especially in the parietal and occipital regions—a possible indication of male sex—but the brow-ridges were not developed, the forehead being smooth and vertical and the face straight. All the sutures were still open, confirming the general impression of youth. Some small wormian bones, two on each side, were apparent in the lambdoid suture. The largest of these, near the right asterion, was no more than 1.5 cm. long. This not uncommon anomaly is said to run in families.

Measurements were as follows: length 172 mm., breadth 125 mm., cranial index 72.7 mm.: a long skull.

Dentition. All the teeth were preserved in situ. The M2's were, in all cases, fully up, but only beginning to show signs of wear. The age is, therefore, certainly greater than about 12 years. The M3's were just emerging from the alveoli, but even the most forward left M3 only just protruded from the maxilla and was still buried in the gum. Since these teeth normally erupt from age 18 years onwards, the age of the present individual is probably two years less than this, at the most. The M1's were already in the second stage of wear, showing inliers of exposed dentine, as were the median incisors above and all four incisors in the mandible. On the evidence of the teeth, an age between 14 and 17 years would be acceptable.

Most of the teeth were perfect, but the left M1-2 showed decay—a large distal cavity in the former, a small one on the occlusal surface in the latter. Neither of these was due, as so often in prehistoric subjects, to unusual rate of wear by a gritty diet, out-pacing formation of secondary dentine and so exposing the pulp-cavity. The lesions are clearly pathological and so, perhaps, due to some dietary deficiency.

Scapula. The most lateral parts of the two scapulae were preserved and showed that the coracoid processes remained unfused with the main part of the bone at death. As this generally takes place about the fifteenth year, an age less than 15 is indicated.

Pelvis. The ilium, ischium and pubis were still separate on both sides. Since they normally unite at the acetabulum about the age of puberty (say, 15) this also indicates an age towards the lower end of the range suggested. The auricular areas on both ilia were well preserved. No trace of a pre-auricular sulcus could be seen. This indicates male sex.

Clavicles; long bones. The epiphyses were all loose—even the olecranon epiphyses of the ulnae, which normally initiate the process of fusion between the ages of 15 and 16 years.

Measurements of the long bones were taken, with a view to estimating the stature, but as the formulae used to apply to the adult body proportions and as this subject had clearly not finished growing, the conclusions must be treated as very approximate only: Humerus 23.7 cm., Femur 34.6 cm. These yielded a height in life of 144.7 cm. or close to 4 ft. 9 ins.

Diagnosis: a young male, aged 14-15 years, under 5 ft. tall.

BURIAL B (East side)

This consisted of an adult with a young child. The bones of the former (i) were very well preserved, save for the usual deficiences in the axial skeleton, the extremities and the thinner parts of the skull. The child (ii) was clearly represented only by the bones of the skull-vault.

(i) Skull. As reconstructed, the skull had the following dimensions: length, 180 mm.; breadth, 139 mm.; height (auricular), 112 mm. The cranial index is 77 (mesaticephalic).

The sutures of the vault were still traceable, but synostosis had clearly begun in the region between the vertex and the obelion and in the middle of the coronal suture on both sides. These conditions suggest early adulthood, but it has been shown that age-estimations based on fusion of skull sutures are very unreliable. The lambdoid suture presented some small wormian bones in both its branches. These were possibly blood-relations of the boy, above.

The bones of the vault were not unduly thick and the muscular impressions were only slight, as

was the development of the brow-ridges. The mastoid processes, however, were fairly strong. While the former features would all suggest female sex, the last would operate in the opposite sense, in many cases. One must, however, remember that the mastoid development may be a functional, rather than a sexual, feature: e.g. when females are in the habit of carrying burdens on the head.

Dentition. All the teeth were present, though the right M3 was loose, owing to the breakage of the socket in which it should have been fixed.

The extensive and equal wear of all the teeth showed that there was an edge-to-edge bite. All were greatly worn, even to the M3's which were already nearly smooth. The M1's were in the fourth stage of wear, an unbroken area of dentine exposed all over the crown and worn hollow. The upper median incisors had a worn chewing surface some 5 mm. in width, measured in a bucco-lingual direction. Even the premolars, above and below, were almost smooth. This degree of wear in an individual who can hardly have been much over 30 years of age suggests an extremely rough and gritty diet.

A few of the teeth showed serious decay. In the mandible, all three molars on the left side were affected. The cavity was something like half the volume of the whole crown in M1, one fifth in M2 and more than three-quarters in M3, which was a mere shell. The pulp cavities were exposed in all three cases. It was surprising that the corresponding teeth on the other side were all perfectly sound, though apparently no less worn. In the upper jaw, the left M1 had a large distal cavity, the right M2 had lost at least half its crown to a similar lesion and the M3 on the same side was, again, just a shell of enamel. The pulp-cavities were exposed as before and the pain from these teeth must have been agonizing. None however, appeared to have developed a root-abscess, so that the first impression that death may have been due to general septicaemia brought on by bad teeth is perhaps mistaken.

Of the remainder of the skeleton, most of the vertebral column, the scapulae and pelvis, were fairly complete, but in a somewhat decayed and friable state. It was possible to reassemble most of the pelvis. The clavicles and most of the long bones were well preserved, the extremities exceedingly fragmentary. Of the main long bones the right femur and the left humerus and radius were complete enough for measurements of maximum length and an estimation of the individual's stature in life.

Pelvis. When reassembled, this was of a typically female form in appearance. The presence of a well-marked 'pre' -auricular sulcus (generally found rather below, than in front of, the auricular area for articulation of the sacrum and ilium), confirms the conclusion from the general shape of the pelvis. When present, this is an extremely reliable proof of female sex.

Long bones. All the epiphyses were completely fused with their shafts, proving full adulthood. The gracile development of the shafts was consonant with the sex, as determined above. There was some antero-posterior flattening of the shafts of the femora (platymeria) and of those of the tibiae in a transverse direction (platynemia). These features appear to be functional, perhaps related to habitual posture, and are commonly found in the bones of British Neolithic and Bronze Age peoples.

Measurements were as follows: right femur: 43.2 cm.; left humerus: 30.6 cm.; left radius: 22.8 cm. From these, the living height was calculated as 161.5 cm. by five different formulae, the maximum difference between the results being no more than 7 mm. This was an unusually satisfactory result, the difference being, in the case of most imperfect ancient bones, a matter of centimetres rather than millimetres. A height close to 5 ft. $3\frac{1}{2}$ ins. is indicated with some confidence.

Diagnosis: adult female, between 20 and 30 years of age, probably in the lower half of that range, with a standing height of 5 ft. $3\frac{1}{2}$ ins.

(ii) Child's skull. Only some bones of the skull were saved, the remainder of the skeleton being too much decayed for preservation. Among them was a temporal bone, in which the squamous part, though fixed to the petromastoid part, still showed an incompletely ossified suture. As this fusion normally takes place during the first year after birth, a child over one year of age is indicated, but one not much older than this. In the absence of the frontal bones and the much decayed edges of the very thin parietals, the condition in the region of the anterior fontanelle (closing about the middle of the 2nd year) was hard to distinguish. The very fact, however, that the relevant edges of bone were missing

suggests that frontals and parietals had not yet made contact at the bregma, and this would make the age under 2 years.

Diagnosis: infant in arms, under 2 years, but over one year of age.

(c) From later deposits

Cremation. Fragments of carbonised human bone with one fragment of unburnt femur-shaft, from burnt patch in ditch filling in SE quadrant, perhaps a later cremation.

Worked blade, thick, of white patinated flint, steeply worked down one side and at distal end, the opposite side bruised by use. SW quadrant, from surface soil on edge of barrow. (Fig. 4, 3).

Hollow scraper of grey white patinated flint retaining some cortex, roughly triangular in outline, steeply worked to produce a concave edge along one side. The point at one end of this edge shows signs of use perhaps as a borer. From topsoil over ditch, SE quadrant. (Fig. 4, 4).

Convex scraper on thick oval flake retaining some cortex. SW quadrant, from surface soil on edge of barrow. (Fig. 4, 5).

Peterborough ware. Small sherd of typical ware with remains of overall decoration of impressed and pinched fingernail ornament. From topsoil, SE quadrant. (Fig. 4, 6).

Miscellaneous. Small fragments of prehistoric pottery came from various parts of the site, but are all indeterminate, apart from one from the ditch filling in the SW quadrant which carried horizontal lines of continuous fingernail impressions, possibly from a beaker.

The 'west-east' trench across *Barrow* 37 was an extension of that across Barrow 36f, deflected to cross its apparent centre while preserving the section unbroken. The section was continued eastwards beyond the centre point and a north-south cutting laid out at right angles to it, in each case with staggered balks. In the event the body of the barrow, as seen in these sections and in the area 18 feet square which was cleared around the centre, was found to be very much disturbed, so that the original material of the mound survived as slight traces here and there.

Rabbits, and digging-activities for rabbits, were the main agencies in this destruction, under which the mound had become dark loose soil heavily charged with small chalk rubble with no sign of structure in it. Its maximum height above the chalk surface was 27 inches. Time was running out when this barrow was examined and the areas cleared were confined to those described above. It is practically certain that nothing more would have been learned from a more complete excavation of the mound, but it is admitted that undiscovered secondary burials may well survive on its margins. The enclosing ditch was found in all four cuttings. It varied in size, being larger on east and north (5 feet) than on west and south (3 feet) (Fig. 3). It had a depth in the solid chalk of about 2 feet with a flat bottom and fairly steep sides. The filling of the ditch was a normal succession of weathering and silt deposits.

The diameter of the area enclosed by the ditch was 46 feet and the primary burial-pit was fairly accurately placed at its centre, somewhat to the south-east of the apparent centre-point adopted for the excavation. The pit was oval at the top (28 by 21 inches), but was not regular in section, being strongly undercut on the north-west side. Its maximum depth was 22 inches. The burial had already been

removed: the filling of the pit consisted of ashy soil with a small quantity of cremated bone; and in the filling was one of William Cunnington's lead plaques with the stamped inscription OPEND 1804 WC. A port wine bottle of early 19th century type was found at a depth of 24 inches in disturbed ground over the ditch in the north cutting. This also may reflect Cunnington activity.

The curving furrow-like marks referred to in Barrow 36f were present in this barrow also but here occurred in the surface of the solid chalk at the centre of the barrow in the southern cutting. The other feature shown on the plan (Fig. 2) at the outer end of this cutting was part of a modern slit-trench.

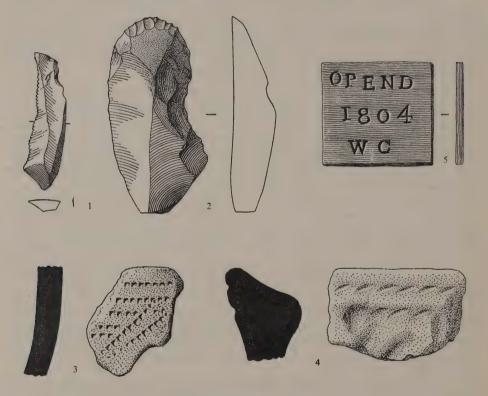


Fig. 5. Lake Barrow 37: finds. 1, 2, 5 (3); 3, 4 (1).

FINDS FROM BARROW 37

(a) Preceding or contemporary with the structure None.

(b) Associated with the barrow

Primary cremation. Dr. Cornwall reports that amongst the small quantity of burnt bones that had survived from earlier disturbance remains of a very thin skull are probably those of a child under ten years of age.

With the cremation was a quantity of much broken charcoal, identified as ash (Fraxinus).

The only other finds were two struck flakes which showed no sign of burning: their presence was probably accidental and they were discarded.

(c) From later deposits

Struck flakes, etc. Struck flakes, occasionally showing evidence of working, were found in various parts of the excavation, in topsoil or in the upper filling of the ditch. The important piece is:

Saw, grey-white patinated flint, an elongated irregular flake with well-marked toothed working

down one long edge. There is no sign of corn-gloss to suggest use as a sickle. (Fig. 5, 1).

The remainder include a number of flakes with edge-working: one a hollow scraper, a rough endscraper (Fig. 5, 2), a convex scraper, a rough conical core, a small ovate implement and a core-trimming.

Peterborough ware. Two fragments, from surface deposits, of characteristic heavily-gritted ware.

Beaker pottery is represented by a number of small sherds. Three, from topsoil or near it, come from vessels of good thin red ware with decoration of fine corded lines; these are of B-beaker type, but are too fragmentary for illustration. Another (Fig. 5, 3), of normal ware with decoration of good notched lines suggests A-beaker: but the form is uncertain.

Bronze Age pottery. A fragment of bevelled rim (Fig. 5, 4) is too small to be fully determined but appears to belong to a cinerary urn. The ware is of normal type, red-brown externally, with dark core. The surviving decoration consists of horizontal corded lines perhaps with oblique lines below. The internal bevel is plain. From topsoil in the NE quadrant.

(d) Recent finds

Lead plaque (Fig. 5, 5). Roughly square (1.8 by 1.7 ins.), stamped OPEND/1804/WC. From primary burial pit.

Port wine bottle, early 19th century, from disturbed ground over the ditch in NE cutting.

Barrows 38, 38a-b

In his numbering of the barrows of the Lake Group Colt Hoare for some reason did not number one visible mound: the small one, already noticed, between his Nos. 3 and 4. In addition to this there was the small ring ditch with its burial pit, which presumably was not recognisable on the surface, on the west side of No. 4. Goddard appears to have followed Colt Hoare in omitting the visible barrow, as also has Grinsell. This and the ring ditch have therefore been given individual letters, 38a, b. The sequence does not necessarily carry any chronological implications. For 38 and 38a, but b, as will be seen, is later than both.

Barrow 38 itself had an overall diameter of about 45 feet and was about 2 feet high. It merged with Barrow 39 to the east. The apparent centres of the two mounds were aligned roughly north-west-south-east. Excavation was by the quadrant method, with staggered balks arranged so that the 'west-east' section intersected the area of contact with Barrow 39. Except for parts of the balks the whole of the

platform of the barrow was finally cleared, together with about one third of the enclosing ditch on the east side. The ditch was sectioned also along the balks in the south and west; and as the plan shows much of the surface area of its filling was exposed.

The body of the mound had been disturbed in places and especially at the centre where it consisted of a mixture of soil and chalk rubble; but the original chalk rubble had survived in some areas and particularly in the southern part of the north-eastern quadrant, where also there was a trace of buried soil between the mound material and the solid natural chalk. The processes of cleaning the mound were carried out at a varying pace in individual quadrants and a number of features was recorded while this was being done. As already observed (p. 91), this barrow, according to Colt Hoare, had already been examined by William Cunnington; but Cunnington does not appear on this occasion to have left one of his tablets behind. Considerable care was expended on the examination of the disturbed area near the centre of the barrow in the north-western quadrant. Here about 6 inches above the level of 'natural' traces of two layers of ash were found; with them were three fragments of beaker pottery (presumably an accidental association), flints and some animal bones.

There were signs also of much activity, only part of it due to disturbance, in the south-western quadrant, on the margin of the platform and over the filling of the ditch. Its chief feature was a spread of burnt bones from a cremation-burial covering an area about 4 feet each way just to the west of the 'south-north' balk. The bones were mostly in splinter-like fragments; but one or two human milk-teeth were recognisable amongst them. Apparently associated were fragments of pottery, including part of a base. Presumably the whole assemblage had belonged to a superficially deposited burial which, since it was in any case on the shallow margin of the mound, would have been readily dispersed. In addition, however, there were animal bones, shells, a few struck flakes and a nondescript Iron Age potsherd and a small spiral ring of bronze; so that more than one kind and period of activity was evidently represented. Other areas of superficial disturbance were less extensive and produced finds of mixed date.

When the central area of disturbance had been cleared down to the surface of the solid chalk two pits became evident in the north-west quadrant. The first of these (1), near the angle of the quadrant, was circular, with a diameter of 22 inches. When emptied it was found to have a depth of 5 inches; but its filling of brown earth and stones produced nothing significant: it had been cleared by earlier excavators. The surface retained the skin of black ash which indicated that it had probably contained a cremation. The second pit (2), which appeared to be larger,

was to the south of the first and lay partly under the balk. When finally the balk was removed the pit was found to be elongated, its long axis running into the balk, about 4 feet long by $1\frac{1}{2}$ feet wide. Its filling was very similar to that of pit No. 1: it also had been disturbed in the past. The finds from the filling included one rimfragment of Peterborough ware. It is not certain that pit No. 2 contained a burial; but in any case the more central position of pit No. 1 in relation to the ring ditch suggests that it was probably primary.

During the clearing of the barrow platform several hollows were exposed in the surface of the natural chalk: some were natural; others produced occasional signs of human activity. Two small holes near the north side of the south-western balk may have been post-holes, but this is not certain. They contained a chalk rubble filling with some dark soil and produced an animal tooth, a scrap of bone, a struck flake and a molluse shell; but were not necessarily connected with the barrow.

More important was a series of pits in the eastern half of the barrow. First of these from the north was pit No. 3, circular, 15 inches in diameter and 6 inches deep. Its filling consisted of ash and charcoal but was otherwise featureless. Pit No. 4 lay six feet away to the south. It was nearly circular, 16-18 inches in diameter and $9\frac{1}{2}$ inches deep. The filling was a mixture of soil and ash, with many small stones, with a few small animal bones. In the filling, lying mouth upwards but tilted over to the south-east was a small collared urn (Fig. 6, 1). The rim of the urn was level with the top of the pit and was partly visible before the filling was touched (Plate XI, 1). An important point was that the pit was completely covered by the undisturbed chalk rubble of the mound. It should therefore be primary.

Pit No. 5 had a diameter of only 11 inches and a depth of 6 inches. It contained the crushed fragments of a collared urn (Fig. 6, 2), which had originally been set mouth-downwards in it. This pit was $10\frac{1}{2}$ feet from Pit No. 4. Pit No. 6 was $7\frac{1}{2}$ feet further south again. Larger than the last, it had a diameter of 18 inches and a depth of 11 inches. It contained a filling of dark ashy earth and charcoal. Halfway down in the filling was a small barrel-shaped pot, leaning over somewhat from the vertical and in the northern part of the pit, the top to the west (Plate XI, 2 and Fig. 6, 3). Pits 5 and 6 appeared to be cut into the natural chalk through the lower part of the rubble mound, but to be covered and sealed by the upper part, as if the burials had been inserted even as the mound was being completed; but the condition of the mound makes certainty on this point difficult. All four pits were set at about the same distance from the centre of the barrow.

The ditch of Barrow 38 was sectioned on west and south (Fig. 3) and a sector on the east side was cleared in order to study its relationship with the ditch of Barrow 39. Throughout almost the whole of the rest of the circuit its edges were

exposed. On the west the ditch was almost vertical-sided, flat-bottomed, rather more than 18 inches deep and about 4 feet wide at the top. On the south side it was similar, except that its inner slope was largely destroyed by the cutting away of the platform in the neighbourhood of the dispersed cremation described above. Whenever exposed in its unaltered state the filling consisted of a very hard-packed chalk rubble.

The cleared sector on the east side straddled the north-east and south-east quadrants. It was seen that the ends of the penannular ditch of Barrow 39 cut into the ditch of Barrow 38. Quite independently therefore of the stratigraphical evidence the primacy of Barrow 38 is established. The ditch of Barrow 4 had served to complete the enclosure of Barrow 39.

More is said about the relationships of the two ditches under Barrow 39. The ditch of the earlier barrow on the east side was perhaps slightly larger than elsewhere but was of the same profile. One more cremation pit (7) was found to have been cut into its inner slope on the line of the common section of the two barrows (Fig. 3: see also Plate XI, 4). The pit, a large one over two feet across, had not only destroyed the inner side of the ditch but had cut into both the primary and the secondary sitting: it had clearly been inserted after the ditch had filled up. The pit was emptied in two stages, the second half being left until the balk containing it could be removed. The cremated bones lay at the bottom with a mass of ashes overlying them. Sieving of the contents of the pit produced no further finds. The cremation had evidently been inserted while still hot; the side of the pit showed signs of having been affected by heat.

FINDS FROM BARROW 38

(a) Preceding or contemporary with the structure

Struck flakes were found in some numbers in various parts of the barrow. Some showed signs of use along the edges. None was kept.

Beaker sherds. Two small fragments, joining, of base of beaker of red-brown ware, uniformly fired, decorated with horizontal lines of fine impressed cord ornament. Probably B-beaker. From angle of NW quadrant below top-soil; but should perhaps be regarded as coming from the area of later disturbance.

Animal bones etc. The following were identified by Dr. Cornwall: fragmentary scapula of small ox; pre-molar of young Ox (both from body of mound); tooth (M¹) of young Pig (from holes in surface of SW quadrant) with snail shell (Pomatias elegans).

(b) Associated with the barrow Primary burial (Pit 1) in NW quadrant

Cremation burial. A small quantity of calcined bones with a few scraps of charcoal, all indeterminate. In addition, from the disturbed area at the centre and very probably derived from the primary burial came a small collection of bones of which Dr. Cornwall reports that the only recognised pieces were fragments, carbonised but not calcined, of the head of a human femur and the articulating acetabulum; also a fully calcined fragment of a large long bone.

Pottery. Collection of sherds, mostly small, of Bronze Age pottery, evidently from a small cinerary urn; the only distinctive pieces are parts of the base, the remainder being quite plain. Reconstruction is impossible, but the quantity of sherds suggests that they belong to the urn accompanying the burial. (Two or three sherds with a redder superficial colour may not have come from the same pot).

Flints. One rough core; a single struck flake (not retained).

Satellite burial (Pit 3) in NE quadrant

The cremation consisted mainly of crumbs and of indeterminate fragments, but Dr. Cornwall has identified amongst them the tooth-germs of milk teeth. The cremation was therefore that of a human infant.

Cinerary urn. Small (height 5.75 ins.), unevenly modelled, of good ware of normal Bronze Age type, with yellow-brown external surface; coil-built. Well-formed almost flat bevelled rim. The decoration is all impressed cord: the impressions are large but indistinct in places. On the rim bevel there is a single zig-zag line; on the external collar two simple herring-bones defined by horizontal lines; and on the shoulder short, spaced-out vertical lines. (Fig. 6, 1).

Secondary burials (Pits 4-7 and scattered burial)

Pit 4 (NE quadrant)

This pit yielded a filling of fine ash and charcoal; nothing else.

Pit 5 (SE quadrant)

The cremation. Dr. Cornwall reports that this contained some small pieces of human skull, the

bones thin and as far as they could be seen, with all sutures open. Child or young person.

Cinerary urn. Represented by base and rather more than half of upper part, giving a restored height as drawn of 7 ins. The ware is very coarse but hard-fired, with dark almost black surface in places, paling to brown in others. The surface is gritty and harsh to the touch, lacking the normal Bronze Age finish; and is pitted and worn in part. The decoration consists of broad and deep impressions which are often indistinct but in several places can be seen to be made up of cord-impressions. The internal bevel of the rim carries a single line; there is a coarse lattice-pattern on the external collar. (Fig. 6, 2).

Pit 6 (SE quadrant)

Cremation, No bones. The pit produced only dark ashy soil and finely divided charcoal,

Urn. Small plain barrel-shaped urn, complete, height 4 ins. Hard-fired, of darkish grey-brown ware with coarse gritty surface. Rim bevelled internally. (Fig. 6, 3).

Pit 7 (E edge of platform)

Cremation. Dr. Cornwall reports that the remains fall clearly into two groups: the first (A) well burnt but incompletely decarbonised, blue-grey in colour and comprising all the larger fragments; the second (B) smaller in total quantity, completely calcined, white in colour and very thoroughly comminuted.

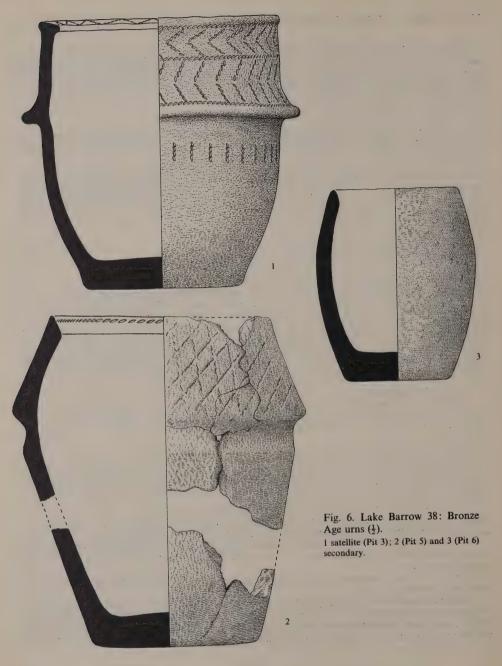
The discovery of two humeral heads of which the former belongs to group A from its condition, while the latter is clearly of group B, evidently *not* from the same individual (for 1 is sound while 2 is markedly arthritic) points to the presence of remains of two distinct cremations.

A was a healthy young adult male, represented by many sizeable skull-fragments with still-open sutures and in particular the central part of the occipital squama showing a thick skull and strong

nuchal musculature.

The rest of the remains were broken very small and are incomplete, though most parts of the body are represented.

B was represented by a similar quantity of generally rather small fragments, among which pieces of skull were noticeably few. Those which were found came from a skull of much lighter build than No. 1. Three larger fragments were of interest: (1), of the pelvis, included the sciatic notch and part of the margin of the adjacent auricular area: this might be construed as being of female sex, though not



conclusively so. (2) and (3) were parts of the articular surfaces of humerus and femoral condyles respectively. Both were markedly porous and in (2) the porosity was associated with distinct 'lipping' of the articular margin suggesting some degree of arthritic change of the joint surfaces.

Hence, B appears to have been possibly a female, certainly of light build and, from the arthritis, of more advanced age than A.

Scattered cremation (SW quadrant)

Cremation. Dr. Cornwall reports that the very volume of the material suggests the possible presence of more than one individual, but the cremated remains were broken into very small pieces after burning so that very little is recognisable. Pieces of a very stoutly built long bone (?femur) suggest an individual of male sex. A few pieces of skull-vault were similarly stout, with open sutures. A young adult male (?).

Pottery. A number of sherds representing at least two pots, the larger part of red ware with black interior and containing much large grit. The surface is well finished and the ware is harder than 'native' Bronze Age. It is most likely to be Late Bronze Age/Iron Age A. The circumstances of finding do not make it quite certain that these sherds were truly associated with the cremation, though it seems likely that they were. The whole area was much disturbed and the remaining material from it (referred to below) was probably due to domestic activity.

Flints. One broken convex scraper; the rest featureless struck flakes, not retained.

(c) From later deposits

From central disturbed area (NW quadrant) over primary pit

Peterborough pottery. Rim sherd of grey-buff ware, blackened in part, containing flint grit; hard and well-fired. Decoration throughout of broad grooved lines, a simple lattice pattern with a horizontal line below on the interior; a herring bone on the exterior; and oblique lines on the bevel of the rim giving the edge a serrated appearance. (Fig. 7, 1).

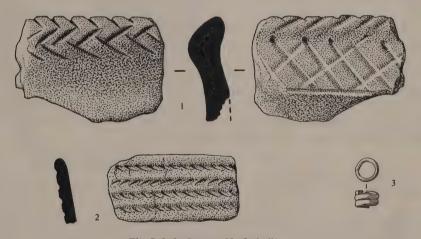


Fig. 7. Lake Barrow 38: finds (†).

Beaker pottery. Fragment of rim, probably from a Wessex B-beaker of thin reddish ware, with decoration of fine corded lines. (Fig. 7, 2). Of other small fragments another is also probably from a beaker.

W. F. GRIMES

Miscellaneous. Amongst a quantity of struck flakes several with signs of use and two convex scrapers; a small quantity of pre-Iron Age potsherds without distinctive features; a small quantity of cremated bones, indeterminate (I.W.C.); one tooth (Pm) of sheep or goat.

From ? occupation-area, SW quadrant

Pottery. Quantity of potsherds, most of them belonging to one pot of good well finished dark ware, the only distinctive piece being part of a base. Several pots appear to be represented by the remaining miscellaneous fragments. The general impression is of a Late Bronze-Iron Age A occupation scatter, rather than a burial association.

Bronze. Double spiral ring, diameter 0.3 ins. (Fig. 7, 3); small fragment of bronze wire. Bones. Fragmentary mandible of large Ox; rest indeterminate.

From topsoil generally

A miscellaneous collection of struck flakes with one or two cores; a few potsherds of prehistoric types, none significant; a small quantity of animal remains including an unworn tooth of Red Deer (F.W.C.).

Barrow 38a lay between Barrow 38 and Barrow 37. There was a clear interval between 38a and 38, superficially it seemed that 38a might make contact with 38. The barrow was a small one, perhaps a foot high and about 30 feet across. As already observed, this mound seems to have been missed by Colt Hoare; but the disturbance of the contents of its central burial pit, when found, showed that it had not escaped the attention of others.

Most of the area of the barrow was cleared, but the inner edge of the ditch was not exposed fully along the north side. The diameter of the area enclosed was 19-20 feet. The outline of the ditch was not a true circle. The burial pit proved to be slightly to the south of the centre: it was circular, 20 inches across and 10 inches deep, with a filling of chalk rubble and earth. The side and bottom were quite clean. There were no finds. A very small part of the chalk rubble of the original mound had survived and was visible in the sections.

The ditch did not make contact with that of Barrow 37 on the west side. Its dimensions and profile varied in the section cut, but it was steep-sided and flat-bottomed, up to 40 inches wide and 21 inches deep.

FINDS FROM BARROW 38a

Central cremation: nothing surviving.

Flint. Small irregular struck flake with slight retouch along one side. W quadrant, from topsoil.

Barrow 38b. During the clearing of the south-west quadrant of Barrow 38 and of the south-east quadrant of Barrow 38a what appeared to be the outline of a shallow ditch in the chalk surface was seen to cut into the ditches of both barrows. The outlines of this feature, about which there was some doubt in the first place, were not completely exposed. It appeared to be somewhat irregular, with maximum internal diameters of about ten and (perhaps) eleven feet. The ditch was particularly

difficult to trace on the south and south-eastern sides, largely because of the damaged state of the chalk surface. Its filling consisted of chalk rubble and soil of a slightly darker (greyish) colour than the decayed natural chalk.

Barrow 38b was clearly later than either 38 or 38a. On the north side the ditch profile was visible where it cut into the filling of the ditch of Barrow 38a. On the south side also it could be seen in the filling of the ditch of Barrow 38, but it was difficult to say exactly where it ended and it was in this part very shallow in any case.

At the approximate centre of the enclosed area a circular pit 19 inches across was exposed when the ground was cleared. When emptied it proved to be only 3 inches deep as surviving, but contained a small collared urn, slightly tilted over to one side at the centre (Plate XI, 3). The pot was mouth upwards; as a result the upper part had been crushed and part of the collar had disappeared. The burial had presumably been covered by a low mound, but the surface before excavation gave no clue to its existence, so that the term 'barrow' is perhaps mis-applied. Dispersal by ploughing was no doubt the cause of its destruction, and ploughing may well have caused the damage to the urn.

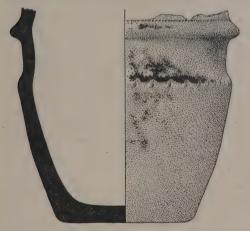


Fig. 8. Lake Barrow 38b: urn from primary burial (\frac{1}{2}).

FINDS FROM BARROW 38b

Central cremation. Finely divided charcoal only: no human remains.

Cinerary urn. Crudely modelled, so that it is oval in plan, perhaps distorted by pressure. The upper part of the collar is missing. Height as surviving 4½ ins. The ware is fairly well finished with smooth light brown external surface, dark core and darker brown interior. The projecting flange has broken away in places, showing that it was built out over the concave neck. The ornament: on collar as surviving, a line of comb-impressed dots in groups; on shoulder, a row of spaced-out impressions of unequal depth, crescentic or sometimes almost triangular in outline. They do not appear to have been done with the finger-tip. (Fig. 8).

Barrow 39. This barrow, the most easterly of the group, its further margin lying beyond the field-boundary in the wood, had an apparent diameter of about 45 feet and a height of about 2 feet.

The mound was found to be composed of the usual chalk rubble, which appeared to be quite solid in places but was in fact everywhere charged with a great deal of soil. Much of the disturbance was due to burrowing animals: moles were very active in the balks overnight even during the excavation; fresh rabbit bones also occurred commonly.

The primary burial pit was found in the north-east quadrant. It had already been excavated: its filling of chalky brown soil produced a few bones. From the south eastern part of the south-east quadrant in the course of clearing came scattered bones, some human and evidently the remains of a disturbed burial. The chalk rubble of the mound yielded in addition to the ubiquitous struck flakes a barbed and tanged arrowhead (Figs. 10, 3). An unusual find was an intrusive pebble of chalcedony, as well as scraps of prehistoric pottery.

The chalk surface of the barrow-platform was finally removed over the whole area except for the part to the south-east that lay beyond the field-boundary. Apart from being more irregular than usual—the result possibly of disturbance by posts—the surface was featureless. In the central area, however, there was an extensive roughly rectangular area in the form of a hollow in the chalk which contained a comparatively soft chalk rubble not unlike that which made up the body of the mound. Traces of a thin buried soil overlying the hollow suggested that the feature might be natural, but animal bones and flints were found in it as well as a single sherd of undecorated coarse pottery. The disturbed area when completely exposed was found to extend well into the southern half of the barrow platform. A fragment of beaker pottery with corded decoration came from the edge of a patch of black soil on the eastern edge of the disturbance.

The primary burial pit lay somewhat to the north-east of the area enclosed by the ditch. It was oval in outline (30 by 24 ins.) and 24 inches deep. On its west and south sides the pit made contact with the larger area of disturbance described above and its edge had in consequence been lowered. It was evidently on the south and south-west sides that the earlier excavators broke into the pit; and from this direction that it was emptied.

The existence of an encircling ditch was first established in the north-western quadrant. The outline of the ditch as exposed here was followed round to south and west to meet the ditch of Barrow 38. With the superficial contact established the two ditches were then cleared southward towards the junction, where a face was left for the study of any contact made between the two fillings. The evidence of more than

one section face exposed during this work showed that Barrow 39 was later than Barrow 38: the lower compact chalky rubble of the latter had been cut through by the ditch of 39. But in any case, had there been any doubt on this score the ditch of Barrow 39 was found as clearing advanced to be penannular (Plan, fig. 2). Its ends were about 16 feet apart, and the gap between them was filled by the unbroken ditch of Barrow 38, which thus marked the boundary between the two.

Both to north and to south the ditch of Barrow 39 was deeper than that of Barrow 38. On the north of the flattened end of the later ditch cut into the floor of the Barrow 38 ditch to about half its width (Plate XI, 4). About 4 feet back from the end of the later ditch—that is, to the east—a large pot was found standing upright, its base at a fairly high level in the ditch filling, in the top of the upper slow silt of fine earth and chalk. The pot was crushed, but most of the fragments appeared to be present. Its earth filling was featureless, apart from a slight trace of carbonised matter.

In the south-western quadrant a trench set out to establish the relationship of the ditches at their southern junction revealed that the later ditch had been cut right through the filling of the ditch of Barrow 38. Its end, larger and more rounded than on the north, actually cut into the inner lip of the Barrow 38 ditch, at this point only 8–9 inches deep in the solid chalk. Here as on the north the ditch of Barrow 39 was about 7 inches deeper than that of Barrow 38. Apart from the pot already described the finds from all this work consisted of a flint scraper from the top of the silt of the Barrow 39 ditch, and a few struck flakes from the floor of the ditch, all in the neighbourhood of the south junction.

The ditch of Barrow 39 where examined away from the junction above described was found to be steep-sided and flat-bottomed. The dark humus overlying its filling on the south-west side produced a fine scraper from just above the silting; and here again were several struck flakes.

FINDS FROM BARROW 39

(a) Preceding or contemporary with the structure

Disturbed burial. Unburnt fragments of human pelvis; two unfused vertebrae; two fragments of right ilium with auricular area for sacral articulation: no pre-auricular sulcus; one metacarpal shaft. Male (under 21 years). (I.W.C.). From irregular pit in the SE quadrant to south of central burial pit, beneath apparently undisturbed chalk rubble; therefore preceding the barrow.

Animal bones. Mostly cattle, but horse, pig and sheep or goat also represented. Some chewed by dog. From chalk rubble and soil in upper part of barrow, disturbed in places, so that the exact relationship is uncertain. Modern objects came elsewhere from very similar positions.

(b) Associated with the barrow

Central cremation. A few fragments of indeterminate cremated human bone, with later intrusive pottery (below). Some oak charcoal.



Fig. 9. Lake Barrow 39: urn from ditch (1/2).

(c) From later deposits

Biconical urn. Irregularly modelled but hard-fired, with warm brown external surface, unevenly finished but of fairly smooth texture, blackened in places. Ware contains some large grit: it is of Late Bronze Age rather than 'native' type. Height as restored 10 ins.

The angle of the base is well marked; the rim section varies, with a tendency to be everted in places giving way to an internal bevel. There were originally four boss-like lugs on the shoulder; and two holes, countersunk from the outside flanking an ancient crack, presumably a repair rather than anchorage for a lid. Decoration consists of a series of closely-set irregular impressions on the angle of the shoulder: they do not appear to have been done with the finger nail or finger tip. (Fig. 9).

From high up in the ditch filling on the NW side about 4 feet back from the north end of the ditch.

Apart from a suggestion of a small organic deposit the contents of the urn were featureless.

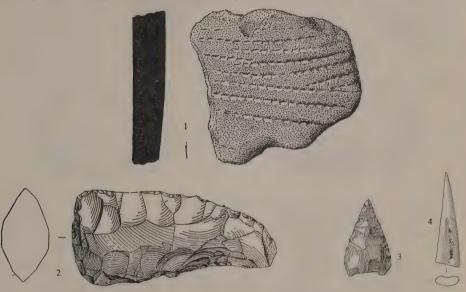


Fig. 10. Lake Barrow 39: pottery and other objects. 1, 3, 4 (4); 2 (4).

Disturbed human remains*

(i) Fragments, uncremated, of human bone: frontal skull fragment (? male); right humerus and ulna (fitting); scapula, ribs and vertebra. SE quadrant, topsoil.

(ii) Small quantity of human bone (cremated) mainly long-bone fragments, some of thin (? female or juvenile) skull; large humoral head (? male). (I.W.C.) SW quadrant, central disturbance: perhaps derived from primary burial.

(iii) A dozen fragments of uncremated human long bones, including radius, ulna, fibula. A disturbed inhumation (I.W.C.). Central disturbance.

*Though here listed separately, these do not necessarily represent distinct burials.

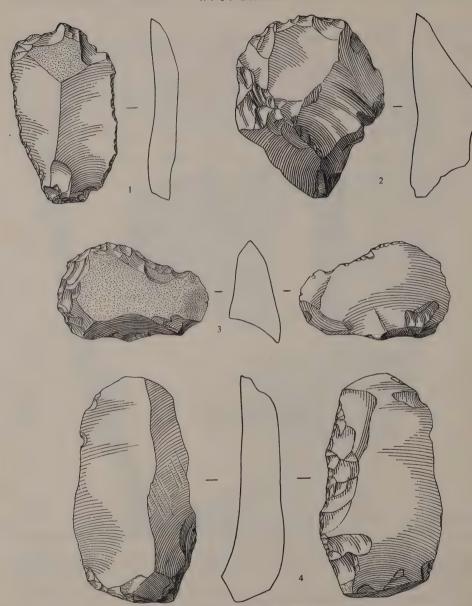


Fig. 11. Lake Barrow 39: flint implements $(\frac{2}{3})$.

Peterborough ware. One worn fragment, probably part of a heavy rim. NW quadrant; topsoil. Beaker pottery. Fragment of wall of ?A beaker of good ware; relatively thick wall. Notched decoration of oblique and horizontal lines. Intrusive in central pit. Fig. 10, 1. A second fragment from the pit may also be of beaker ware, but is featureless.

Three sherds, probably beaker, from SW quadrant in area of general disturbance.

Other pottery. Various sherds, Late Bronze Age, Iron Age and Romano-British, from superficial or disturbed deposits in various parts of the barrow.

Flint implements

Roughly flaked irregular axe, slightly twisted both in plan and in side view, with pointed oval section. Length 3.3 ins.; width 1.5 ins. From SW quadrant, topsoil. (Fig. 10, 2).

Flake, slightly worked down long sides. Length 2.8 ins. NE quadrant, topsoil. (Fig. 11, 1).

Barbed and tanged triangular arrowhead, the tang missing; present length 0.8 ins. SE quadrant, in disturbed rubble in upper part of barrow. (Fig. 10, 3).

Thick *flake*, edge-worked on bulbar face. Length 3.55 ins. NW quadrant, ditch filling. (Fig. 11, 1). End- or convex *scraper* on thick flake. SW quadrant, topsoil. (Fig. 11, 3).

Large convex scraper on thick crude flake. SW quadrant, upper filling of ditch. (Fig. 11, 2).

Convex scraper. SW quadrant, upper filling of ditch.

Bone point. Triangular in section, made from metatarsal of sheep (I.W.C.). Broken; present length 1.0 ins. SW quadrant, undisturbed central area. (Fig. 10, 4).

Animal remains. The following were represented by teeth and/or bones:

in topsoil: sheep or goat, ox.

from ditch filling: pig, small ox (some bones gnawed by ? dog).

from central disturbed area: ox (some gnawed by carnivore), pig, sheep or goat, horse. (In addition a quantity of fresh rodent-bones, mainly rabbit, and an ulna of a bird of about the size of a thrush).

Barrow 36g. This barrow, a tiny affair almost invisible in 1959, lay detached to the south or south-east of the main group. Its surface had the appearance of having been disturbed by a slit-trench in recent times. The mound showed as a rise of a few inches; its diameter was 12–14 feet.

Excavation consisted of clearing an area at the centre of the barrow round and including the slit trench, with cuttings to north-east and south-west along the same alignment to determine the limits of the mound. The cuttings revealed two sectors of a ditch slightly over 20 feet apart internally which was not looked for elsewhere but no doubt enclosed the barrow. The sectors were equal in width (about 50 inches), that to the north-east being irregular in profile and about 15 inches deep, that on the south-west V-sectioned and only 8 inches deep.

At the centre the area of modern disturbance was found to coincide with an irregular elongated pit which may well have been the slit-trench itself. It was about 6 feet long (SW-NE) and 3 feet wide and being over the centre of the enclosed area would have coincided with the site of the primary burial. In the clearing of the pit and of the surrounding area many fragments of late Bronze Age pottery were found. It seems very likely that they were associated with the primary burial.

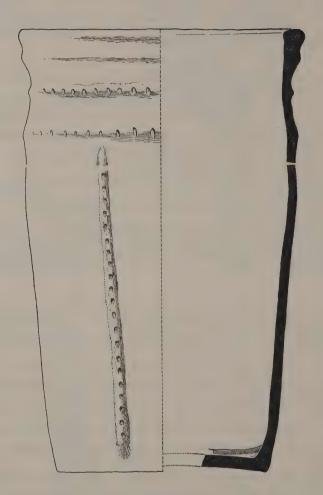


Fig. 12. Lake Barrow 36g: reconstruction of urn (4).

FINDS FROM BARROW 36g

The material here listed came from the disturbed central area of the barrow and is presumed to be in a general sense contemporary with it as all that survives of the primary burial.

Cremation. Dr. Cornwall reports that the fragments of calcined human bone submitted to him included pieces of skull (including the external occipital protuberance, probably male); a head of a

humerus; and fragments of unidentifiable long bone.

Pottery. Many fragments of a large urn of good hard-fired ware, thin for the size of the pot, with pale brownish internal surface, dark core and well-finished brown to dark grey external surface. The fragments do not provide sufficiently accurate measurements to make a reconstruction possible and the profile is not complete. The base had a diameter of about 9 ins.; it carries on its inner surface part of a heavy rib. Though heavier than the rest of the pot two small fragments of rim are thought to belong: their ware is identical with that of the other fragments. This is confirmed by rim-fragments and other sherds found in rabbit scrapes in 1950 (V.C.H. Wilts I, i, 198), lent by Mr. Annable for comparison. Below the rim was a slight hollow neck defined by a shoulder which bore spaced-out ?finger-tip impressions; and below that again a series of vertical ribs round the wall of the pot which were similarly ornamented. The ribs stopped short of the angular base of the pot. The drawing (Fig. 11), is a 'free' reconstruction incorporating the recognisable features; it is not accurate in detail since the original height cannot be determined.

DISCUSSION

This group had added nothing new to the body of existing knowledge of Bronze Age barrow structure. All the members of it display the characteristic enclosing ditch; in all cases the primary burial was by cremation in a pit at or near the centre of the enclosed area. In every barrow the original surface as far as it was exposed was featureless: there were no indications of stake-holes or the like. The structure of the mounds also appeared to be simple, the material being small chalk rubble with some admixture of soil. Where undisturbed this rubble was quite compact; but apart from the central areas which had been dug out by earlier excavators and back-filled no doubt by subsequent ploughing the body of each mound was much disturbed by the activities of rabbits, the bones of which, in relatively fresh condition, were found in several places. Damage from this cause or from the activities of rabbit catchers was particularly extensive in the case of Barrow 37, and the possibility has already been acknowledged that the limited clearance of the area of this barrow may have left secondary burials on its margins to be discovered.

It was fortunate that in spite of this destruction sufficient structural evidence survived in significant situations to enable the relationships of the important additional burials to be precisely determined. Particularly was this the case with Barrow 36f. There, in spite of the much reduced height of the mound it was possible to see that both skeletons were sealed by undisturbed barrow material. The bodies had been placed on the original ground surface before the mound was constructed and they were therefore true satellite burials, the symmetrical arrangement of the

skeletons to east and west of the central cremation emphasing their subordinate relationship to it. A further point of interest here lies in the contrasting disposition of the skeletons (Plate X). That of the boy in his early teens on the west was tightly flexed, the body lying on its side with legs drawn up and arms bent in a manner characteristic of Bronze Age inhumations. Too little remains of the child burial on the east side for its arrangement to be recognised; but the posture of the adult woman nearby suggested less gentle treatment than was accorded the other body. It is as if the body were dropped unceremoniously, if not violently, into position, front downwards, with head turned to left and arms bent but loosely splayed away from the body, the spinal column curved and the legs lying awkwardly to the right, at rather less than a right-angle.

Though satellite burials—that is, burials which can be shown to be contemporary with the primary burial of the monument constructed to receive it—are of not uncommon occurrence, the association of inhumations with a primary cremation of the type recorded here appears to be rare; the contemporaneity of the two rites of cremation and inhumation is interesting, but it might be dangerous to argue from it that the complex as a whole actually belongs to an inhumation/cremation transition, if such it may be called. It is well-known that this transition in the south of England covered the floruit of the Wessex culture, with the dominance of inhumation in the first phase giving way to a dominance of cremation in the second.8 and with some barrows in which the two practices occurred side by side.9 The problem of the present site is to know to what extent the variation in the burial rite reflects the relationships in life of the persons buried. Here as always in such matters there can only be recourse to speculation, which is rendered the more uncertain by the fact that the sex and age of the primary cremation cannot be known. It can only be said that the ages of the satellite inhumations might suggest some kind of link as family or dependents—a conclusion which perhaps makes the apparently rough treatment of the young woman difficult to explain but nevertheless derives some support from anatomical resemblances between her and the boy (p. 97). When all is said, however, the juxtaposition of the two burial sites in Barrow 36f may still reasonably be taken to indicate a broad correspondence in date with the Wessex culture at about the middle of its period, whether or not the barrow itself was constructed for Wessex people.

Apart from Barrow 36f the only burials in the group that call for special comment are those in Pit 3 and Pit 7 of Barrow 38. Pit 3 being sealed by the material of the mound, was another satellite burial, the remains those of an infant. Again, the

⁸ ApSimon, Inst. Arch. Ann. Rep. X (1954), 53.

Wilts Arch. Mag. 45 (1931) 432 ff.

loss of the primary burial handicaps guesswork as to its meaning, but there is the obvious possibility that the remains might be those of a child of the individual buried at the centre. The urn is a moderately early form of collared urn of very much the same type as that from Barrow 38b below. The remains from Pit 7 provide an example of the other form of multiple burial, that by cremation in which the remains of more than one individual are buried in the same pit. Two persons, a youngish man and an older woman have been identified by Dr. Cornwall here.

The absence of human remains from two pits (No. 6 of Barrow 37 and the central pit of Barrow 38b) is unexplained. Both pits were undisturbed apart from damage to the upper part of the second.

Though some members of the group were superficially in contact excavation showed that the relationship of their structural features was not such as to allow the chronological sequence to be everywhere established. An interval of about 3 feet separated the ditch of Barrow 36f from that of Barrow 37 to the east; and the position here was obscured by the presence of a series of curious curving furrow-like marks penetrating below the humus to which further reference is made below. Barrow 37 must have been parted from its eastward neighbour, 38a, by at least the same distance, though their relationship was not actually seen in section.

In the group to the east, the contacts were closer. Barrow 39 was attached to 38 and clearly later than it; the relationship of 38a to 38 could not be determined because of the distance by which they were separated; 38b was later than both. At the beginning of the series, therefore, Barrow 38 is fixed chronologically by the small collared urn accompanying the satellite burial in Pit 3. The terminus ante quem is provided by the small urn from Barrow 38b. It is unfortunate that the upper part of the profile of this vessel is missing; but as already observed, it is very similar in general character to the urn from Barrow 38. Taken together they indicate that Barrows 38, 38a, b and 39 are not likely to be later than the early part of the middle Bronze Age and that the period covered by their construction was a relatively short one. The remaining pottery calls for little comment on its own account: the individual vessels can hardly be described as outstanding examples of their respective classes. They demonstrate the continuing use of the mounds into the later Bronze Age. The siting of the biconical urn, high up in the ditch-filling of Barrow 39 shows that the ditch had received its full quota of slow chalky silt when the pot was placed in it: the pot appeared to have been set in the top of this filling and was overlaid by chalky humus. It is possible that this pot did not mark a burial, for there were no cremated bones associated with it. But this deficiency has already been noted in two other instances, and though broken the pot was complete: it seems unlikely that it would have survived in that condition had it been associated with domestic activity.

Some sort of ritual purpose seems best to account for its carefully set position in the silted-up ditch

Two other matters remain to be mentioned. The first is the evidence for sporadic activity in the neighbourhood of the barrows both before and after their construction. Neither the earlier nor the later sequence was associated with recognisable evidence of structures, apart from a small post-hole associated with the later activity in the SW quadrant of Barrow 39. Struck flint flakes were abundant everywhere, and like the scraps of secondary Neolithic and beaker pottery were present in the body of the mounds and in the topsoil as well as on the original surface beneath them. Such scraps are to be expected in this area and they are significant only because they bear witness to the populous activity that must have characterised Salisbury Plain in prehistoric times.

The second outstanding point concerns the curious furrow-like features in the area between Barrows 2 and 3 to which brief reference has already been made. They are unexplained and no more can be done here than record their existence. They were observed only in a limited area and were seen fully in the common section across the barrows (Fig. 3). The chief element was a series of deep curved 'grooves' seen in their entirety both in plan and in section in the chalk rubble filling of the barrow ditches (Plate X, 3). In section the grooves were not uniformly spaced or of uniform shape and size: all were convex to the west, the fillings consisting of dark brown soil containing fine chalk which passed upwards into the humus. The edges of the grooves were fairly sharply defined towards the west, but faded into a coarse-grained fine grey chalk rubble on the east. Whatever the explanation the grooves were later than the barrows for the obvious reason that they overlay and penetrated the ditch fillings: but the difficulty of accounting for them is enhanced by the fact that they were present also in the solid chalk under one part of Barrow 37.

ACKNOWLEDGMENTS

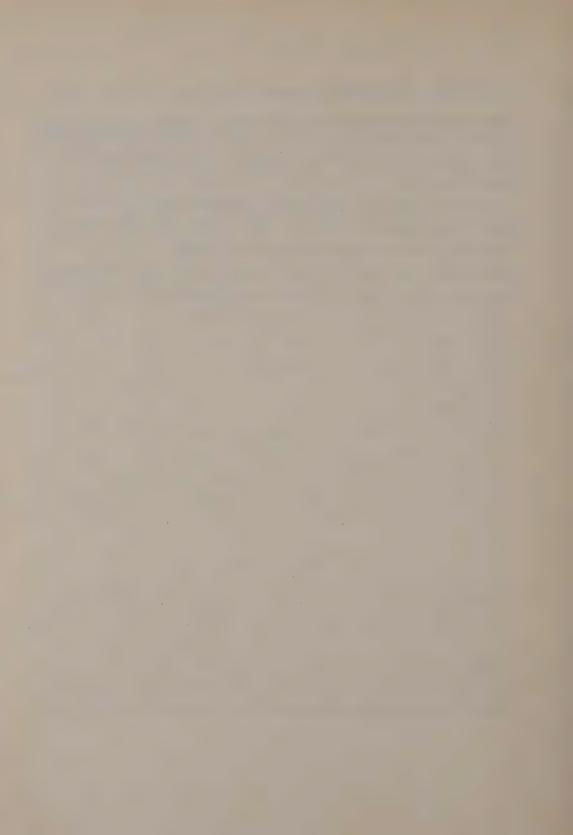
The excavation was a co-operative effort in which many members of the Institute took part, but thanks are due in particular to Professor Evans, who shared the direction, and to Mr. M. B. Cookson and Mr. H. M. Stewart who were responsible for photography and surveying respectively. The general adminstration was in the hands of Mr. Pyddoke.

The thanks of the Institute are due to Mr. C. Noble, Mr. Hosier's farm-manager, for his generally sympathetic attitude on the site; but above all gratitude is owing to Mr. Felix Fenston and Mr. E. R. Turpin who (then and since) have generously allowed the Institute to use the empty living accommodation at Druids

Lodge, thus creating the conditions in which it was possible to undertake the excavation. It has already been said that the work was sponsored by the Ministry of Works (as it then was): in addition to financial help and the provision of huts and equipment the Inspectorate of Ancient Monuments rendered assistance in a variety of ways.

In the preparation of the report much help has been given by Mr. Cookson and by Mr. Stewart, by whom the drawings except figures 3 and 12 were prepared. Special thanks are due to Dr. I. W. Cornwall for his reports on the human and animal remains which are incorporated in the 'finds' sections.

Mr. Hosier has generously consented to present the objects recovered to Devizes Museum, where they join the finds made by Colt Hoare and William Cunnington in the same series of barrows in the early 19th century.



La Tène Chronology, Continental and British

by F. R. Hodson

Until a method of direct absolute dating with a small range of error is available for the Continental and British Iron Age, we are still completely dependent on the traditional archaeological method of 'cross-dating.' This means first establishing a sequence of changing types which will reflect the passage of time, and then tying down more and more fixed points in this sequence by contacts with areas where absolute dating is already available. The method is devious and open to misuse, but it is the only way to tackle a large number of basic archaeological problems. The la Tène chronology is a good example of this approach; it sets out to provide a relative sequence in which some points may be dated by contacts with the Mediterranean world. The standard la Tène sequence of three major phases. Early, Middle and Late, was established in the last century. Since then, there has been a continual search for more precision so that this relative chronology might be given close absolute values, but there is still a surprising uncertainty in dating Celtic objects between about 500 and 50 B.C. The purpose of this article is to discuss some current difficulties of la Tène dating, and to attempt to assess how much precision may be expected from the system as at present developed on the continent and in Britain.2

The first major problem is to decide how widely any standard la Tène chronology is to be applied. The archaeological la Tène culture is the material reflection of a series of Celtic tribes at the time when they controlled or menaced much of Europe, and objects of la Tène type are found over a correspondingly wide area. They stand out from any other archaeological material and, wherever they occur, seem to follow a roughly parallel typology. La Tène fibulae, to take the most obvious example, could be divided by Tischler into Early, Middle and Late forms by the simple yardstick of whether the foot were bent back towards the bow, grasped the bow or were cast in with the bow, and this criterion has been used as a rough indication of date ever since. The range of material at different la Tène sites too seems fairly constant, and by careful selection of a dozen objects Déchelette³ was able to suggest a cultural identity between early Celtic groups in areas as far

By O. Tischler. For an account of this and other early la Tène classifications see J. M. de Navarro, Proc. Brit. Acad. XX (1936), A survey of research . . .

I would like to thank Mr. J. M. de Navarro for the most valuable help he has given me here and elsewhere in approaching problems of the continental Iron Age.

**Manuel d'Arch. IV (1927), Figs. 385, 6.

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apart as the Marne and Bohemia, while for the end of the period it is possible to speak of a general 'Oppidum Civilization' throughout this region. Highly individual styles of Celtic art are equally scattered: Jacobsthal's 'Waldagesheim Style' is known from Britain, Belgium, France, Germany, Switzerland, Italy, Austria, Hungary, Rumania and Bulgaria. And so there are reasons for treating the la Tène culture as a single archaeological group reflecting a historical 'people,' and sharing an overall uniform process of development. On this overall view, it would be expected that a single relative sequence of broad types could be built up from the whole la Tène province and that stages within it would represent fixed periods of absolute time. This is the assumption that is made when any general la Tène type ('la Tène I fibula,' 'la Tène II sword') is used as a dating peg.

However, other evidence implies that this apparent cultural/historical unity behind la Tène material may be in some ways superficial, and that treating 'fai Tène' as a single archaeological group cannot lead to the chronological precision that is desired. Movements of whole tribes or smaller groups of warriors, travelling craftsmen and artists, the specialised production of weapons, tools and pottery—all this is known to have been part of life in the la Tène world, and this would be sufficient to impart a veneer of uniformity to archaeological groups that might, if judged on other grounds, seem quite distinct. These suspicions are confirmed when detailed regional sequences are compared. In some areas where there seems to be unbroken la Tène development, one or more of the standard 'phases' is very poorly represented, or even missing. Northern Bavaria is an extreme example, where 'Earliest' la Tène passes into 'Late' la Tène; but a similar gap of Middle la Tène occurs on much of the Rhine. That there is in fact no gap in the genuine sequence is shown by the unbroken evolution of Early into Late pottery styles in these areas.⁵

Anomalies of this kind may be explained quite simply by local archaism or eccentricity, but they do make it impossible to use even the simplest sequence of general types as a relative chronology throughout the la Tène province. Even less valid would be absolute dates calculated for generalised types in one la Tène area and transferred to another. Before la Tène 'phases' can have any real chronological significance for any particular area, the area in question must be assessed separately, and compared or contrasted with some standard succession.

At once two further basic problems arise: which are the different la Tène groups for which modified sequences may be required, and what constitutes the 'standard' sequence to serve as a scale for comparison—is it an observed local

W. Kimmig after J. Werner, Badische Fundberichte, 20 (1956), 147.
 See especially F. Fischer, Goessler-Festschrift (1954), 38 and pn. 28-30.

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sequence chosen for its central position, or an 'ideal' sequence built up by evidence from different areas?

There is unfortunately no recent general statement that deals with these problems. Some la Tène groups have been given distinct cultural names—the Marnian Culture, for example; but generally speaking, the problem of defining la Tène groups on strict archaeological evidence has been neglected.⁶ The definition of groups must depend on the critical interpretation of distribution maps, but during the la Tène period it is sometimes difficult to distinguish genuine cultural indicators from the products of specialised workshops, whose distribution would reflect the movement of artisans or wide trading contacts rather than cultural grouping.⁷ Even pottery, the most reliable cultural indicator, is at times ambiguous: Dehn's important distribution maps of 'Marnian's and Mid-Rhenish pottery9 almost certainly do indicate cultural distributions, but his map of 'Braubach Cups'¹⁰ is not so simply interpreted. The problem of cultural grouping is especially acute for the focal area of the Upper Rhine and Upper Danube. Krämer¹¹ suggests three broad groups for Early and Middle la Tène in this region: the Upper Rhine, Southern Bayaria with Northern Bohemia, and the Carpathian basin, but more distribution maps are required.

Equally involved is the question of which among the different la Tène chronologies, may be expected to provide the most reliable standard for comparison. Sometimes the local sequence worked out for the Swiss Plateau by J. Wiedmer-Stern¹² and D. Viollier¹³ is applied and given a rough absolute value outside Switzerland. This divides Early la Tène into three sub-phases: Ia, Ib and Ic. Unfortunately, some of the most important phase indicators were not reliable (particularly the fibulae), and the absolute dates were largely guess work.¹⁴ This has led to the neglect of what has the makings of a reliable sequence, which will be discussed in more detail later. The earlier part of the Swiss material has been reviewed by Giessler and Kraft,¹⁵ who were at pains to fit it into the Reinecke four-phase scheme. The latter, if any, is most generally accepted as the basic standard for comparison and local modification.

Surveying the whole la Tène province as it was known at the beginning of the

⁶ The most helpful account is probably R. Giessler and G. Kraft, 32 Ber. R.G.K. 1942 (1944), = Giessler/Kraft, 48 ff., 85 ff.

⁷ cf. the distribution of Swiss scabbards, J. M. de Navarro, 40 Ber. R.G.K. (1959), 116, 7.

⁸ Reinecke-Festschrift (1950), 35, Fig. 1. ⁹ Germania, 19 (1935), 300, Fig. 6.

¹⁰ Bonner Jahrbücher, 151 (1951), Pl. 1.

¹¹ Germania, 39 (1961), 40.

¹² Das gallische Gräberfeld bei Münsingen, Bern (1908) = Wiedmer-Stern, passim espec. 70 ff.

¹³ Les sépultures du second âge du fer sur le plateau suisse (1916) = Viollier, 8 ff.

¹⁴ P. Jacobsthal, Early Celtic Art (1944) = E.C.A., 206, 7.

¹⁵ See note 6.

century, Reinecke¹⁶ could see four clearly defined groups of material, C and D representing, with more precision, Tischler's Middle and Late la Tène: A and B representing a subdivision of the 'Early' material. These four groups represented both phases of time and broad aspects of cultural development in Celtic history, From the beginning, the succession was not an observed sequence of material at one site, or in any one area, but rather a series of four stages of development that could be seen recurring with varying emphasis throughout the la Tène world. As a general cultural/historical explanation of la Tène development, the Reinecke system¹⁷ is of immense value, but as a precise universal chronology it presents difficulties that have become more acute as fresh material has been discovered. and as it has been realised that the pace and nature of development varied from one end of the Celtic world to the other. 18 It is beginning to seem that if any cultural/chronological system like Reinecke's is to be sufficiently loose to encompass all la Tène areas, it cannot be expected to stand as a frame for detailed chronological subdivision for any one specific area. It might seem more reasonable to break away from this partly cultural nomenclature altogether when a detailed chronology is being proposed. 19

J. Filip has taken this step in his work on 'The Celts in Central Europe'.²⁰ He points out that fresh types were being continually devised in different parts of the la Tène world; they would spread, give rise to further types and persist in some areas longer than in others, the whole process being continuous and organic. In such conditions, it is not possible to think of sudden, universal changes in types, and corresponding universal la Tène phases. The sequence of types in each area should be studied, and 'horizons' rather than 'phases' defined by groups of types found regularly associated. Horizons in adjacent areas may then be progressively linked by shared specialised types. For the large Celtic flat-grave cemeteries in Central Europe, Filip defines three main horizons, the second and third progressively, but not abruptly, replacing the first. It is interesting that the second horizon is especially characterised by a type that is not found in Western Europe, the fibula with a large globular head, often decorated in the 'Plastic Style'.²¹

Since Filip has to build up this relative chronology from tomb groups, it is essentially a fabricated sequence, and in fact only one of the relative chronologies so far mentioned has been based on anything more than typology checked by

¹⁶ Mainzer Festschr. (1902), 53 ff.

¹⁷ A readily accessible account of the Reinecke system is given by J. M. de Navarro, Cambridge Ancient History, vol. vii, chap. ii,

¹⁸ e.g. W. Krämer, *Germania*, 39 (1961), 35.

¹⁹ The difficulties involved in defining any 'Late la Tène Phase' or Reinecke D Phase come out very clearly in R. Hachmann's recent review of late la Tène chronology: 41 Bericht R.G.K. 1960, 244 ff.

²⁰ Keltové ve stredni Europè, Prague (1956).

²¹ Ibid., 525.

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cemetery associations over large areas of the la Tène province. The exception is the Wiedmer/Viollier classification which is based principally on material from one localised la Tène group. Of fundamental importance for this group is the large cemetery of Münsingen-am-Rain, near Berne. It is situated at a focal point in the la Tène world and should reflect developments that took place throughout it. Burials were made there continuously over a long period and so should provide a comprehensive series of successive types. But, most important of all, the cemetery exhibits a remarkable horizontal stratification: starting from the north end of a ridge, the cemetery was gradually extended southwards and so has a built-in timescale that is so far unparalleled in the la Tène world.

Münsingen, with neighbouring cemeteries, has been the starting point for a series of basic chronological studies best known through Viollier's classification of Early la Tène into the phases Ia, Ib and Ic. This chronology was a modification of Wiedmer-Stern's, and both have been thoroughly discussed by Giessler and Kraft, 22 who equated Ia with Reinecke A, and Ib and c with Reinecke B. Although Wiedmer had recognised as early as 1908 the chronological importance of the horizontal stratigraphy at Münsingen, Giessler and Kraft were the first to illustrate this importance graphically by plotting²³ the position of tomb groups dated according to Wiedmer's original classification. They emphasised, for example, how from an original nucleus the cemetery was extended slightly eastwards before the main extension south. However, Giessler and Kraft were not able to make use of Jacobsthal's revolutionary work on la Tène art styles and chronology, and they did not fully exploit the potentialities of the Münsingen stratification by plotting the topography of single types, and so there is room for a complete reassessment of this material.

It is not possible here to draw on more than a fraction of the Münsingen evidence; the purpose is simply to illustrate from the published material how the outlines of a precise relative chronology can be built up, and the Viollier chronology modified. The Wiedmer/Viollier classification was in fact basically sound and Jacobsthal understandably preferred it, despite its shortcomings, to any other la Tène chronology available.²⁴ However, some of Wiedmer's and Viollier's most important phase indicators are patently unreliable, and this has made the classification difficult to use. The clearest difficulties are with fibulae: the types chosen as typical of Ib (disc-footed), and Ic (globe-footed), may be seen associated together again and again. Indeed both types have clear prototypes from the start of the cemetery. 25 develop throughout Ib and Ic and continue in use until the

²² See previous notes 6, 12, 13.

²³ Op. cit., Fig. 4. ²⁴ E.C.A., 206.

²⁵ In tomb 12. Best illustrated in O. Tschumi, Urg. Kantons Bern, Abb. 51, 4.

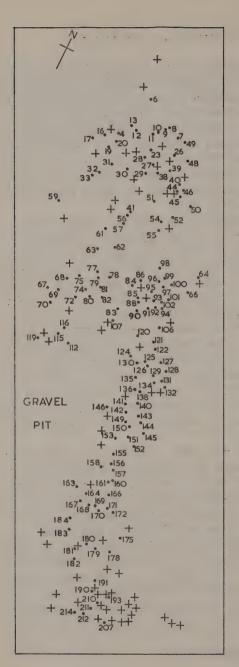


Fig. 1. Münsingen: position of graves with goods (after Wiedmer). + = graves without goods (after Krämer).

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transition with phase II.²⁶ Viollier's fibula types were too generalised to have a precise chronological value.

On Figs. 2-5 are plotted the distributions in the Münsingen cemetery of fourteen different la Tène types that are sufficiently distinctive to be recognisable from the photographs of the Wiedmer and Viollier publications, and sufficiently specialised to have fairly short lives. Fibulae are the principal types studied because they should give most help chronologically; only bronze fibulae are considered because of the uneven preservation and illustration of the iron specimens. The topography of each type shows its position in the overall sequence. The types are then listed according to this order in the Table on page 132, and an 'association profile' is built up of tombs where two or more²⁷ of these types occur.

By studying at first hand every type that occurs in the cemetery, it would be possible to construct a far more detailed sequence than could be attempted here, but even this very partial study is sufficient to point to definite stages in the use of the cemetery that do broadly vindicate the original Wiedmer-Stern classification. Only the most characteristic types will be mentioned.

There is a first stage, Münsingen Ia (Fig. 2), characterised by torcs of various types and by simple fibulae with high-arched bows, large four-coiled springs and simple feet. 28 Some fibulae of this same basic pattern have a small disc instead of the 'wire' foot. 29 Both have the foot bent back almost parallel to the bow. 30 A less regular, but equally distinctive type of fibula with 'knee-shaped' bow is also included on Fig. 2.

The second stage, Ib (Fig. 3), is characterised by more developed discfibulae-the bow is lower and longer, the disc elaborated and upturned at an angle of about 45 degrees, and the six-coiled spring used as well as the four-coiled.31 Some fibulae of this specification have involved curvilinear decoration in Jacobsthal's 'Waldalgesheim Style' (tombs 48, 32 62, 33 and 10734), or with even more classical motifs (tombs 49, 35 and 5036). Certosa-derived fibulae 37 seem to belong essentially to the beginning of this phase rather than to Ia, and at some stage within

²⁶ Tomb 149, Wiedmer-Stern, Pl. 14: 1, 9. Except for the extreme south of the cemetery (tombs 190, 193), where grave goods are much fewer.

²⁸ Wiedmer-Stern, Pl. 1: 5, 6.

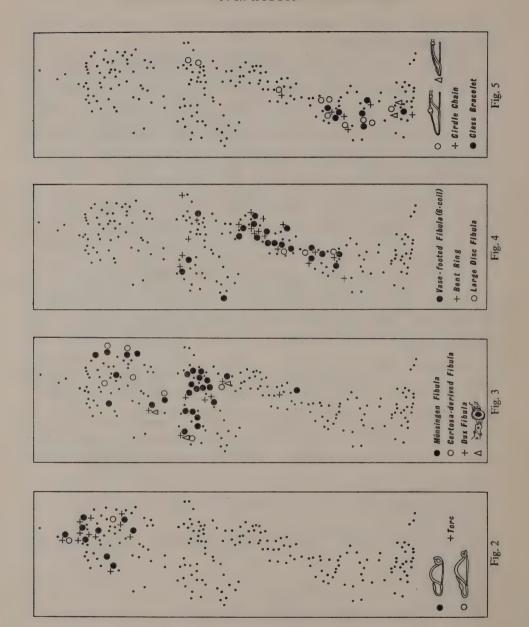
³⁰ The typical profile may be seen in Déchelette IV (1927), Fig. 533: 9, 13, 16.

These are the type often referred to as 'Münsingen fibulae'. See Déchelette IV, Fig. 533: 15, E.C.A. nos. 330-8, 341.

⁸² Wiedmer-Stern, Pl. 5: 7.

wiedmer-steffi, 33 E.C.A., No. 339. 34 E.C.A., No. 334. 35 E.C.A., No. 332. 86 E.C.A., No. 333.

³⁷ E.C.A., No. 339. Wiedmer-Stern, Pl. 7: 9, 10, Pl. 11, 6.



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Ib the 'Dux' fibula appears with globe-head (and therefore Ic for Viollier), and sixcoiled spring with internal cord.38 Both the cemetery topography and the associations suggest that these two fibula types characterise two successive chronological stages within Ib. Bracelets of a specialised 'Deisswil' type with enamel decoration³⁹ run parallel with the 'Dux' fibula.

The third phase, Ic (Fig. 4), is defined by one very clear-cut type: the 'bent rings' of gold, silver and bronze, 40 and also by bracelets decorated in an emphatic 'Plastic' style. 41 The globe-headed fibula with six-coiled spring and external cord does not seem to occur before this phase at Münsingen. 42 The globe-headed fibula with four coils43 has a much longer life and does not seem to be of chronological value without further subdivision that would be difficult on the published evidence. Disc-footed fibulae continue in use into the beginning of this phase, but eventually develop extremely long springs (tombs 81, 44 130, 45 15846), or large discs. 47 This last type seems to occur just at the transition between Ic and II.

Münsingen II proper, Fig. 5, is clearly marked off by the 'Middle la Tène fibula' with foot bound to the bow, tomb 149 providing an early, almost a transitional type, 48 by girdle-chains of bronze and by glass bracelets. Wiedmer-Stern 49 attempted to subdivide this phase into IIa and IIb mainly on the glass objects, but the distinction is not really clear and was rejected by Viollier.⁵⁰ A later sub-phase is perhaps indicated by the fibula typology: the clip joining the foot to the bow gradually becomes emphasised at the expense of the modelling below the joint The two bronze fibulae so altered occur at the extreme south of the cemetery in tombs 190⁵¹ and 193.⁵² They seem to herald in the final stage of the cemetery. which, as W. Krämer⁵³ has pointed out, is marked by a series of graves without any

39 E.C.A., No. 256.

⁴⁰ Déchelette IV, Fig. 544: 7-9.

Like Déchelette IV, Fig. 446. This is the impression given by the published illustrations.
 e.g. tomb 48, Wiedmer-Stern Pl. 5: 12, (early Ib), tomb 149, Viollier Pl. 4: 142, (early II).

44 Wiedmer-Stern Pl. 12: 8.

49 Wiedmer-Stern, 71.

51 Wiedmer-Stern, Pl. 16, 8.

³⁸ It seems essential to limit the 'Dux fibula' to this type with internal cord, like Déchelette IV, Fig. 533: 12, 14.

⁴¹ Jacobsthal E.C.A., 207, includes under the heading 'Plastic Style' a very wide range of decorated bracelets at Münsingen, some of which (e.g. No. 281) are 'Plastic' only in a most liberal sense. This description should surely be restricted to the more emphatic types like E.C.A., No's 262, 264, 273, 280.

⁴⁵ Ibid. Pl. 12: 10.

⁴⁶ Viollier Pl. 2: 71. ⁴⁷ E.C.A., No. 343.

⁴⁸ Wiedmer-Stern, Pl. 15: 1. De Navarro has pointed out to me that this fibula is 'a typical for Switzerland and probably an East Celtic type, cf. Filip, Keltové, Pl. XLV, 7, XXXIII, 14'. The 'Dux' fibula from this tomb is almost certainly an heirloom.

⁵⁰ Op. cit., 8. Perhaps glass bracelets per se indicate a later horizon within II.

⁵² *Ibid.*, Pl. 16: 6. The two iron fibulae with a similar shape also come from the extreme south of the cemetery (tombs 212, 214: Viollier, Pl. 8: 317).

⁵³ Germania, 30 (1952), 331, Pl. 19: 2.

F. R. HODSON

1				-										
Tomb	Torc	Marzabotto Fib3/4coil	Certosa-derived Fib	Munsingen Fib 4/6 coil	Dux Fib	Deisswil Bracelet	Bent Ring	Vase-footed Fib 6'coil	Large-disc Fib	IIa Fib	Metal Girdle-chain	Glass Bracelet	IIb Fib	
12 ⁶ 23 8 9 32 40 44 6	x x x x x x	x x x x x x												Ia
51 31 48 62 46 121 61	x	x	x x x x	x x x x x	××	x x								Ib
6 51 31 48 62 46 121 61 68 79 84 102 81 75 126 130 132 134 136 131 135 157 158 171 161 161 161 161 161 161 161 161 161				x x x x	x	×	x x x x x x x x x x x	x x x x x x x x						Id
171 149 184 101 161 168 164 181 167 178 190					х		×	x x x x	x	x x x x	x x x x	x x x x	х	п
193													x	

Table of associations at Münsingen between the types plotted in figs. 2-5 (p. 130).

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goods at all (Fig. 1, +). There are, of course graves without goods scattered throughout the whole cemetery, but the extreme south-east is marked by an almost exclusive concentration of them, and Krämer argues convincingly that they do represent a definite 'phase' that may reflect wide-spread changes in burial rites in Central Europe.

Such, then, seems to be the sequence of 'phases' at Münsingen. Not all the types fall neatly into one phase—the fibula with large disc is a good example, and after more detailed analysis it may be preferable to define a continuous series of 'horizons' at Münsingen rather than these abrupt phases. In either case, the real sequence is given by the succession of types as seen in their cemetery topography. Münsingen, then (and no doubt other horizontally stratified cemeteries in Central Europe) holds out immense possibilities for the refinement of la Tène relative chronology. Problems of absolute dating may be conveniently approached by attempting to date this revised Münsingen sequence. Jacobsthal's work must remain basic to this enquiry, and it is fortunate that he discussed dates for many of the Münsingen finds.54

Absolute dates for la Tène objects may be calculated from three sources: (1) Classical imports in la Tène contexts, (2) la Tène objects that embody dateable classical influences, especially art styles, (3) la Tène imports in a broadly classical or historically dated context, (1) and (2) give termini post quos for la Tène objects, (3) termini ante. There are essential difficulties with this kind of cross-dating that cannot be too often stressed. A date calculated for any one la Tène object will apply to it, but not to the type as a whole. As the association profile for Münsingen shows, most types have a fairly long life; seventy-five years would not be an unreasonable average to expect. Any object dated could be at the beginning or at the end of this 'life' unless there is comprehensive supporting evidence to show which. This very necessary evidence is available with a sequence of tombs as at Münsingen, but not with isolated associations. This warning applies not only to la Tène objects but to the classical date-givers as well. Quite apart from the 'heirloom' difficulty, 55 dates of production of classical objects cannot always be precise; it was quite possible for Mediterranean workshops to remain conservative stylistically, and for types to be produced unchanged for generations. Jacobsthal⁵⁶ narrowed down the production of Etruscan 'beak flagons' to a half century or so, but this 'life' must be almost doubled.⁵⁷ The Ceretolo jug is now allowed a production life of a century and a half,⁵⁸ and even Greek pottery other than the work of master painters is

⁵⁴ E.C.A., 207, 8.

⁶⁵ E.C.A., 143, K. Schefold, Prähist. Zeitschr. 34-5 (1949-50), 11 ff.

E.C.A., 136.
 O. H. Frey, Ann. Litt. Univ. Besançon, II (1955), 29, 30; ibid., Germania, 35 (1957), 236 ff.

difficult to date closely. Dating by historical events (Belgae in Britain, etc.) is again full of pitfalls. And so, with all these uncertainties, it would be uncritical to pretend that any la Tène dates before 50 B.C. are at present definitive to anything like \pm 25 years.

With these reservations, approximate dates for Münsingen may be attempted. There are no direct classical imports, and so absolute dates have to come by methods (2) and (3) above. Termini ante quos are suggested by objects decorated in the 'Waldalgesheim' and 'Plastic' styles. The former is represented in tombs 48, 62, 107⁵⁹ and 184.⁶⁰ The first appearance of this style in tomb 48 is not likely to lag behind its first appearance anywhere—certainly not Italy, where the style seems to have taken root by 300 B.C. or so. 61 Münsingen Ib, then should start before, perhaps appreciably before, this date. The very classical decoration on the fibulae from tombs 49⁶² and 50⁶³—again at the start of phase Ib, suggests a terminus post for the beginning of the phase somewhere in the fourth century B.C. 64 Münsingen Ib cannot really begin before the Celtic invasion of Italy, and the vogue for the 'Certosa-derived' fibula in the early part of this phase could be a reflection of Celtic enterprise south of the Alps.

A pronounced 'Plastic Style' occurs on bracelets throughout Münsingen Ic. The evidence from Mezek suggesting that this style was developed by about 275—25065 is not decisive by itself, nor is the recent find of la Tène anklets from a well in Greece. 66 These are less elaborate than the 'Longirod' bracelets with 'Plastic' decoration from tombs 75 and 149 at Münsingen, 67 but are related to them and to other Ic types. 68 That they are a relic of the sack of Delphi by the Celts in 279 cannot be proven, but this is the most likely interpretation. Mezek and Delphi together, then, may be taken provisionally as implying that Münsingen Ic had started by 280 B.C.

These dates for phases Ib and c are vague, but they are directly related to Münsingen material. Dates for the other stages may only be suggested on more general grounds. Ceretolo, 69 and the Pergamene parapet reliefs70 (depicting

⁵⁹ See notes 32-4.

⁶⁰ Wiedmer-Stern, Pl. 16: 4. E.C.A., Pl. 271: 294. It is interesting to see how late the style may persist in a simple form, and how dangerous it is to 'date' isolated objects stylistically.

⁶¹ E.C.A., 144. Jacobsthal, op. cit., 207, hazards 350 B.C. for the beginning of the style 'as a fair guess'

⁶² E.C.A., No. 332, Pl. 273: 348.

⁶³ Ibid., No. 333, Pl. 273: 349.

⁶⁴ Ibid., 86.

⁶⁵ Ibid., 151, 207.

⁶⁶ W. Krämer, Germania, 39 (1961), 32 ff.

⁶⁷ E.C.A., No. 273.

e.g. the bracelets from tomb 145, Wiedmer-Stern, Pl. 9: 6, and tomb 157, *ibid.*, Pl. 10: 2 (transitional Ic-II).
 O. Klindt-Jensen, *Bronzekedelen fra Brd* (1953), Fig. 21, Pl. X: d,e. J. M. de Navarro, 40 Ber. R.G.K. (1959),

^{83,} n.8.

⁷⁰ T. G. E. Powell, The Celts, Pl. 48, 9.

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'Middle la Tène' objects at a time not later than 181 B.C.)⁷¹ suggest that Münsingen II should start by or before 200. For the beginning of the cemetery it is perhaps worth mentioning that one Marnian chariot burial with a 'beaked flagon', (la Gorge-Meillet), contained fibulae⁷² of the Ia type plotted on Fig. 2, and that the belt buckle from Münsingen 6 need not be separated 'by too long an interval from the related pieces, of which that from Ensérune is dated about 400 B.C.' (Jacobsthal),⁷³ so that the cemetery could quite well go back into the fifth century B.C.

Dates for the latter part of the cemetery are even more obscure. It has been suggested by Fischer⁷⁴ that the end of the larger Swiss la Tène cemeteries could coincide with the migration of the Helvetii in 58 B.C., but one of his main reasons for this date is that the relevant finds date entirely from before the 'Nauheim fibula' horizon of Central Europe, which itself starts at about 50 B.C.⁷⁵ 58 B.C. is really a date ante quem.⁷⁶ The latest bronze fibulae from Münsingen are typologically not yet at the end of the 'Middle la Tène' series: even the most southerly examples in the cemetery have some sort of modelling between the foot and the actual join of foot to bow.⁷⁷ And so there is room for typological development between the latest Münsingen and the first true la Tène III fibulae. In the Wetterau and the area around Mainz, at least, this gap does seem to be real, and to be filled by an assemblage earlier than the Nauheim fibula horizon.⁷⁸ Circumstances may have been quite different in Switzerland, but the balance of evidence does seem to favour 100 B.C. as the latest possible date for the beginning of Münsingen IIb. Taking all these dates together, they suggest the following approximations (Fig. 6).

This whole Münsingen sequence is *a priori* valid only for the Berne area of Switzerland: the value of any 'standard' relative or absolute la Tène chronology is doubtful, but if such a standard scheme be required, Münsingen seems at present

to hold out the best possibilities.

For Britain, this sequence might be of some help provided that too much is not expected from it. Fairly direct connections of some sort between Britain and la Tène Switzerland are not inconceivable—if nothing else, there is always the Ic bent ring from Park Brow, ⁷⁹ certainly not a 'Marnian' type; and where specialised Münsingen types occur in Britain, it seems reasonable to use them as a rough

⁷¹ J. M. de Navarro op. cit., 115, n. 136.

Fourdrignier, *La Gorge-Meillet*, Pl. 8.
 E.C.A., No. 365: 208.

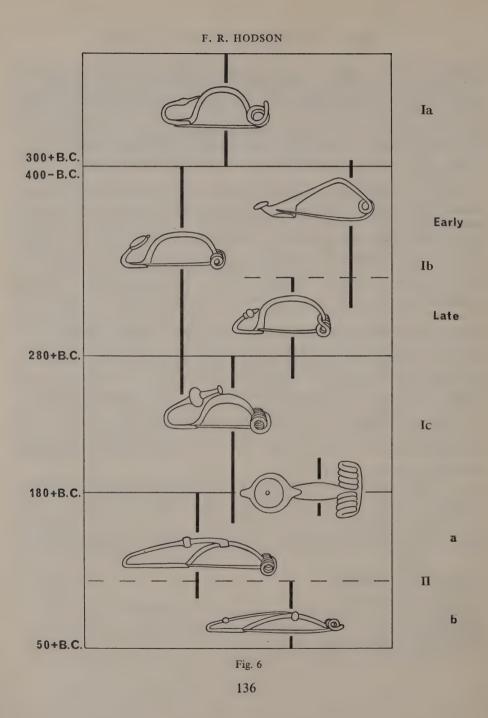
⁷⁴ Goessler-Festschrift (1954), 40.

⁷⁵ J. Werner, *Jahrbuch Mainz*, 2 (1955), 170 ff. R. Hachmann, 41 *Ber. R.G.K.* (1960), 253.

⁷⁷ See notes 51-2.

⁷⁸ H. Schönberger, Saalburg Jahrbuch, 11 (1952), 66.

⁷⁹ C. F. C. Hawkes, Sussex Arch. Colls. 80 (1939), Fig. F, 1.



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terminus post quem. In a general way, too, the typological developments at Münsingen may help to understand la Tène typology in Britain. For instance, among British la Tène fibulae, there is an obvious distinction between types that occur regularly at Münsingen and types that do not. There are 'Dux' fibulae with internal cords from Berkshire, 80 and from the Thames at London, 81 and an iron version of the Ib disc-footed fibula from Findon Park (frequently referred to as a Viollier Ic fibula).82

Far more striking and significant are the numerous Ia fibulae in Britain which repeat the high arching bow and large four-coiled spring of the Münsingen Ia types plotted on Fig. 2. When complete, the British Ia fibulae seem often to be of the small disc-, not the wire-footed type, and some are very finely decorated, implying, perhaps, a point of departure right at the end of Ia. The best known of these British fibulae are from Maiden Castle, 83 Worth, 84 Box, 85 Wood Eaton, 86 Hunsbury, 87 and Cowlam. 88 This last is of the utmost importance, 89 because it was found with an inhumation in the area of Yorkshire that was to remain the centre of la Tëne burials in Britain, 90 and it was accompanied by a bracelet with a pointin-socket clasp. 91 An almost identical tomb group comes from Yvonand on Lake Neuchâtel. 92 Here, if anywhere, is a la Tène intrusion into Britain, but its date of departure is, in Münsingen terms, before the end of Ia, or in other words at about the time when the Celts were sacking Rome.

It is not until the appearance of the Late la Tène fibula that there is another large series of fibulae in Britain that is so close to Swiss, or indeed, to any other continental prototypes. Apart from the occasional Ib imports mentioned above, most fibulae in Britain that are typologically between these Ia and III types are either patently local varieties like the 'long flat bow', 93 'involuted',94 or 'hingedpin'95 fibulae, or the less obviously local 'Blandford'96 type. This combines features

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80 Wallingford, C. Fox, Archaeologia Cambrensis, 82 (1927), 88, Fig. 19 B.
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⁸¹ Three displayed in the London Museum.

⁸² C. F. C. Hawkes, Sussex. Arch. Colls. 80 (1939), 235.

⁸³ R. E. M. Wheeler, *Maiden Castle*, Fig. 81: 1. 84 *Antiq. Journ. 20* (1940), 120.

⁸⁵ C. Fox, Pattern and Purpose (Nat. Mus. Wales, 1958), Fig. 13: d.

⁸⁶ Ibid., Fig. 13: b.

⁸⁷ *Ibid.*, Fig. 7; a, b. ⁸⁸ *Ibid.*, Pl. 2: D.

⁸⁹ E. M. Jope, Problems of the Iron Age in Southern Britain, Univ. of London, Inst. of Arch., Occasional Papers II, 81,

⁹⁰ I. M. Stead, Antiq. Journ. 41 (1961), 44 ff.

⁹¹ B.M. Iron Age Guide (1925), Fig. 126.

⁹² Tomb 1, Viollier, 134, Pl. 2: 39; Pl. 22: 122. ⁶⁸ Numerous variants ranging from Ham Hill to Sawdon, C. Fox, Pattern and Purpose, Fig. 13: g, Fig. 5, Pl. 11: 1.

⁹⁴ Ibid., Pl. 12: A, 9: E, F, etc.

⁹⁵ *Ibid.*, Figs. 4, 5, 9, 11, etc. 96 Ibid., Fig. 13: a, c, Pl. 31: 26, 27.

of the Münsingen Ia and Ib fibulae that are not found combined at Münsingen or, to my knowledge, regularly elsewhere on the continent: it has the longer bow and smaller coils to the spring of Ib, but preserves the foot parallel to the bow of Ia. This mixture of old and new hints at provincialism, most likely British provincialism, although it is not impossible that the type belongs to a la Tène outpost on the continent, like Brittany.

At all events, strict Münsingen Ic, IIa and IIb⁹⁷ fibulae do not seem to occur in any number in Britain. However, rather than discussing single types that may or may not have a precise chronological significance, British Iron Age chronology may be approached in a more general way.

The expected procedure would be to build up as detailed a sequence of local British types as possible to serve as a relative time scale which could then be tied down absolutely by contacts with the classical world. Direct contacts for cross-dating are increasingly abundant from about 15 B.C., but are not likely to be available from much before 50 B.C. Before then, absolute dates must be calculated at second hand by cross-dating with the Hallstatt or la Tène systems. This double remove from the dating source is bound to make any British absolute dates before the first century B.C. very approximate indeed. For this reason, Hawkes' recent attempt⁹⁸ to start with a rigid absolute chronology and to fit essentially undateable material into it seems unrealistic for the earlier part of the British Iron Age.

Until 1931, it was customary to date British material by direct reference to the continental la Tène chronology. However, Hawkes then⁹⁹ suggested that the local nature of the British material made this unsatisfactory, and he introduced A, B and C. These were cultural divisions, but no relative chronology was envisaged to replace the outmoded la Tène phases. Hawkes' A, B and C were in fact often used as chronological rather than cultural divisions. This ambiguity was cleared up in 1959, 101 but the relative chronology is still missing.

The first need is for a few genuine sequences of common types in different parts of Britain to act as a check on typology, which can otherwise run riot. For the continent, this check could be achieved by studying large numbers of associations in tomb groups, or, more satisfactorily, by horizontal stratigraphy. To be really useful for Britain, the sequences must be of the sort that can be applied to standard farmstead and hillfort sites, and they must be sought by the only means available—by meticulous settlement stratigraphy at sites that have been occupied

101 Antiquity, 131 (1959), 174.

⁹⁷ The status of British 'long-straight-bow fibulae' of Middle La Tène construction is problematic.

 ⁹⁸ Antiquity, 131 (1959), 174.
 99 Antiquity, 5 (1931), 60 ff.

e.g. Hawkes' own distribution maps were labelled Periods A, B and C. Antiquity, 5 (1931), 63, 78, 91.

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over long periods. Maiden Castle¹⁰² probably comes closest to indicating how a sequence of pottery groups and metal objects could reflect the passage of time over centuries, but even here there are difficulties in defining the transition from one group to another, the survival of coarse pottery styles and the sequence of development within the three broad, successive groups. Much of the value of pottery sequences will depend on the proportions of different wares in different levels, and the need to study total assemblages on a numerical basis cannot be escaped.

It must inevitably be some time before a series of reliable relative sequences of this sort will be established and inter-related. Until then, it would be useful to have some general relative chronology for the British Iron Age. There are two methods of approach: the first would be to start with a very broad interpretation that could be refined as more evidence appears. The second would be to build up a complete, hypothetical scheme that is to be corrected as more evidence appears. The danger of this second approach is that by mixing fact and hypothesis at the start, it becomes difficult later to disentangle them, and further, that by offering an explanation—albeit incorrect—to all problems, it tends to conceal that so many problems exist. The first approach, although more hum-drum, will be attempted.

The Claudian conquest marks a convenient horizon with which to end the 'British Pre-Roman Iron Age' in a chronological system. Before then, what chronological horizons with more than a very local significance does the evidence

permit?

From about 15 B.C. on, historical references, inscribed coins and imported fine ware from Roman Gaul make direct absolute dates feasible. One horizon somewhere earlier in the 1st century B.C. should be marked by the introduction of the la Tène III fibula. The type is known from different cultural groups in Britain, and may be expected to serve as a fairly general chronological indicator. However, the absolute date of its introduction into Britain is uncertain. Until recently, it was usual to apply Caesar's statement about Belgae in Britain at about 75 B.C. to the Aylesford archaeological assemblage, which includes the la Tène III fibula. But many different archaeological groups in Britain and on the continent may have been ethnically 'Belgic' to Caesar, and Allen's research on coin distributions has shown how complicated may have been the process of Belgic settlement in Britain. The equation Aylesford Group='first Belgae in Britain' cannot be accepted as a fact on which to base further conclusions. The continental evidence

104 Problems of the Iron Age in Southern Britain, (cit.), 97 ff.

¹⁰² R. E. M. Wheeler, Maiden Castle Dorset, (1943).

¹⁰³ C. F. C. Hawkes and G. C. Dunning, Arch. Journ. 87 (1930), 244 ff.

for the appearance of the true la Tène III fibula has been discussed in detail recently by Hachmann, but with negative results. 105

The phase in Britain between the introduction of the la Tène III fibula and 43 A.D. does provide a useful end-phase to the British Iron Age, and it is possible to see a number of clear archaeological groups in existence then: the Aylesford and related groups with pedestal urns¹⁰⁶ are perhaps the most influential, and provide the best evidence for absolute dates, but there are also the groups using pottery with elaborate curvilinear decoration in the south-west (like Glastonbury)¹⁰⁷ and probably over much of the rest of Britain, the Sutton Walls group, 108 the Maiden Castle 'War Cemetery' group and others. It is perhaps convenient to think of this phase as the 'Later Pre-Roman' (Iron Age), and of these groups as essentially 'Later Pre-Roman' groups. Before this 'Later' phase, it is difficult to point to any regular chronological landmarks for the settlement and hillfort material. Pottery varies so much locally in the earlier British Iron Age, that it seems hazardous to assume from it inter-regional fixed points in chronology. It is quite possible that the introduction of types like the ring-headed pin, weaving comb, Münsingen Ia fibula or involuted fibula may prove to define chronological horizons with a fairly general validity, but because of the paucity of strict associations, the early history of each of these types in southern Britain is quite obscure. The theory of a distinct horizon of Marnian invasion corresponding with Münsingen Ic110 is not based on sound evidence, 111 and the largely typological and local distinctions between A1 and A2 (or First A and Second A)¹¹² need stratigraphical refinement. And so, as far as any inter-regional chronology is concerned, it would perhaps be safer to start by grouping together all this development at settlements as 'Earlier Pre-Roman' (Iron Age) until general stages within it can be defined by specific types.

How far elaborate curvilinear decoration on pottery goes back before the Later Pre-Roman as here defined (i.e. before the introduction of the la Tène III fibula) does not seem clear. Radford's¹¹³ dating by associated glass bracelets of the series of curvilinear-decorated pottery at Castle Dore is hardly acceptable. These bracelets start in la Tène II in western Europe (cf. Münsingen), and continue in use

^{105 41} Ber. R.G.K. 1960, 255.

¹⁰⁶ For distribution see Hawkes and Dunning, op. cit., 189, Fig. 7.

¹⁰⁷ A. Bulleid and H. St. G. Gray, The Glastonbury Lake Village, 1911. Distribution of 'Glastonbury Pottery' see A. Fox, Problems of the Iron Age in Southern Britain, (cit.), 52, Fig. 20.

¹⁰⁸ K. Kenyon, Arch. Journ. 110 (1953), 1 ff. Distribution as known in 1938: T. C. Hencken, Arch. Journ. 95 (1938), 89, Fig. 13. J. Brailsford, *Proc. Prehist. Soc.*, 24 (1958), 101 ff.

¹¹⁰ C. F. C. Hawkes, Antiquity, 33 (1959), 179 with refs.

¹¹¹ K. Kenyon, Univ. London Inst. Arch. 8th Annual Report (1952), 56 ff. F. R. Hodson, Antiquity, 34 (1960), 139, and see remarks above about 'Ic' fibulae.

¹¹² Hawkes, op. cit., 179.

¹¹³ Journ. R. Inst. Cornwall, n.s. 1, Appendix (1951), 68 ff.

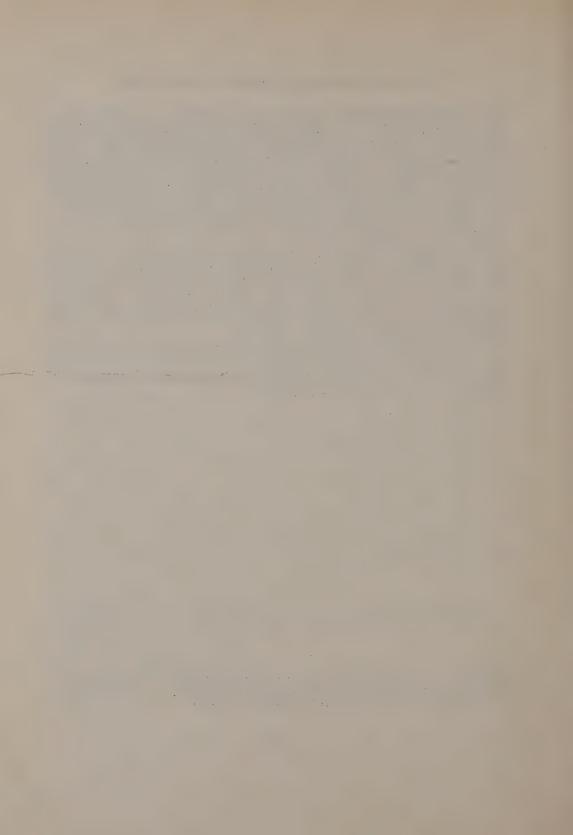
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in the 'Oppida' like Manching, 114 and so cannot be accepted as evidence for the 3rd or even 2nd century occupation of this site. The St. Mawgan evidence¹¹⁵ points late, as do the large series of fibulae from Glastonbury and Meare, 116 where of 47 'dateable' fibulae in all, 43 are la Tène III types, 3 late la Tène II (and in parts of the continent probably contemporary with III), and only one a British derivative from a continental la Tène I model; all this sure evidence that the greater part, if not all the occupation at the 'Lake Villages' was of the 'Later Pre-Roman'. The early history of this whole pottery group needs careful scrutiny. The 'Sutton Walls' group is in a similar position.

The simpler curvilinear decoration and other pottery features of Maiden Castle B possibly do precede this 'Later' phase, and may represent a distinct 'Intermediate' phase with more than a local significance, but the evidence is not yet clear. It is not known which fibulae belong with this assemblage, and Durotrigian coins are not vet decisive, since it cannot be asserted which archaeological groups used which early coins in Britain.

This general relative chronology of two broad phases, then, seems to go as far as settlement evidence readily permits. There would be no difficulty in subdividing these phases as more good evidence comes to light, and this twofold system could perhaps serve as a starting point for discussion.

<sup>W. Krämer, Neue Ausgrabungen in Deutschland, Pl. 1 (opp. 192). For Castle Dore see especially Nos. 1, 30.
L. M. Threipland, Arch. Journ., 113 (1957), 33 ff., especially 53 (survey of pottery types).
Op. cit. (n. 107), 183, and Bulleid and Gray, The Meare Lake Village, 2, 204.</sup>



Megiddo, Hazor, Samaria and Chronology*

by K. M. KENYON

It is in the tenth century B.C. that Palestine comes into the full light of history. In the third and second millennia B.C. a reflected light from Egyptian, and to a lesser extent Mesopotamian, written history illuminates the scene, peopled only by archaeological facts and theories as far as the local evidence goes. For the thirteenth, twelfth and eleventh centuries B.C., the Biblical records mainly represent oral tradition written down years later, or much edited and corrupted fragments of early records. It is only from the time of the United Monarchy, established by David c. 995 B.C., that there are historical chronicles approximately contemporary with the events they record.

From the tenth century B.C., therefore, there is a record of events which should be reflected in archaeological evidence, without any of the ambiguities that make it so tempting to suggest variant theories concerning the earlier periods when the archaeological evidence does not appear to fit the literary version. It is thus very important that the archaeological evidence should be correctly interpreted, so that the dating evidence from key sites can become the basis for sound conclusions elsewhere.

The key sites for the Solomonic period are Megiddo and Hazor and for the early ninth century Samaria. It remains to be seen whether the present excavations will find enough evidence surviving from early Jerusalem for it to serve a similar role for the period of David and Solomon in the centre of the country. In I Kings, IX, 15 it is stated that the levy that Solomon raised was, in addition to the work in Jerusalem, to build 'Hazor and Megiddo and Gezer.' There are therefore strong grounds to expect evidence of major building activity in the time of Solomon at Megiddo, Hazor and Gezer. As regards Samaria, in I Kings XVI, 23–24 it is

^{*}The following abbreviations are used in references throughout this article:

A.A.S.O.R. Annual of the American Schools of Oriental Research, New Haven, Connecticut.

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I.E.J. Israel Exploration Journal, Jerusalem, Vol. 8, 1958.

M I, M II R. S. Lamon and G. M. Shipton, Megiddo I, Seasons of 1925-39, Strata I-V; G. Loud; Megiddo II, Seasons of 1935-39. Chicago, 1939, 1948.

SS I, SS III J. W. Crowfoot, K. M. Kenyon, E. L. Sukenik, Samaria-Sebaste I, The Buildings, London, 1942: J. W. Crowfoot, G. M. Crowfoot, K. M. Kenyon, Samaria-Sebaste III, The Objects, London, 1957.

Samaria Reisner, Fisher and Lyon, Harvard Excavations at Samaria, Harvard, 1924.

The article was submitted in March, 1962 and takes no account therefore of publications since that date.

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recorded of Omri 'six years reigned he in Tirzah. And he bought the hill Samaria of Shemer for two talents of silver, and built on the hill, and called the name of the city which he built, after the name of Shemer, owner of the hill, Samaria.' The implication would seem to be that Omri transferred the capital of the northern kingdom from that of his immediate predecessors to a virgin site.

It was long ago suggested¹ that the identification in the excavations of 1925–1934 of Stratum IV of Megiddo as the Solomonic town could not stand, tempting as it was to associate the stables that occupied so much of the summit with the 'chariot cities'² of Solomon. Dr. Y. Yadin has now produced proof of this that seems conclusive. In the excavations at Hazor, conducted between 1955 and 1958, he found a casemate wall and gateway, marking the rebuilding after an appreciable interval of a much larger city destroyed in the thirteenth century. These defences the excavator ascribes with great probability to the building activities of Solomon described in I Kings. It must, however, be remarked that they probably represent the defences of an acropolis or royal quarter rather than of a town. The contours of the excellent air photograph (Hazor I, Pl. I) suggest that the Iron Age town occupied half of the original tell, whereas the casemate wall enclosed only the western third; moreover, between Stratum VIII and Stratum VA, the wall was apparently in ruins, though the site was still fully occupied, which would hardly have been the case if it were the town wall.

By two brilliant pieces of work,3 Dr. Yadin has been able to trace identical systems of fortification at Megiddo and Gezer, thus greatly strengthening the presumption that all are the work of Solomon. At Megiddo, the so-called Stratum IV gate is almost identical in plan and dimensions with that at Hazor. But, as published in Megiddo I, it was associated with a wall built in a series of offsets and insets, and the other buildings of Stratum IV are certainly about a century later than the time of Solomon. In a lightning campaign of only three days, Dr. Yadin found beneath the offsets and insets wall a casemate wall very similar to the wall at Hazor; though the association of this wall with the 'Stratum IV' gate was not established, it seems very probable. Moreover, the casemate wall was found to be integral with a massive building of character identical with the 'palace' 1723 in the southern part of the mound, and this newly-found building ran underneath the northern of the stable complexes that form such a large part of Stratum IV. The 'Stratum IV' gate, the casemate wall and the two forts, 'palace' 1723 and the new building, can therefore be accepted as the work of Solomon at Megiddo. Stratigraphical proof has therefore been provided for the conclusion I reached in

e.g. S.S. III, pp. 199-204, A.A.S.O.R. XXI-XXII, pp. 2-3.

² 2 Kings IX, 19.

[&]quot; I.E.J., 8

⁴ Biblical Archaeologist, 1960.

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S.S. III⁵ on pottery and structural evidence that the stables were not Solomonic, though the 'palace' 1723, for which there was no pottery evidence, can be restored to that period. The question of the rest of the plan of Megiddo Strata V and IV will be discussed below.

In the case of Gezer, Dr. Yadin identified in defences ascribed in the 1902–1909 excavations to the Maccabaean period⁶, half of an extremely similar gateway, with an associated casemate wall, and again the identification must be accepted, though the excavations were carried out too long ago for any stratigraphical proof to have been obtained.

Thus a very strong case has been made out for dating structures at these three sites to a period between c. 960 and 935 B.C., and at Megiddo and Hazor there is a considerable mass of associated pottery and other material, obviously very valuable for applying this dating evidence to other sites. This Dr. Y. Aharoni and Mrs. R. Amiran have proceeded to do in a valuable article, in which the evidence of the finds from Hazor X, Solomonic, to the end of Hazor V, destroyed by Tiglath-Pilazer III in 732, is used as the framework.

In so doing, they have run into difficulties in relation to the evidence from Samaria. Like Hazor, the history of Samaria is clearly recorded, between its foundation by Omri c. 880 B.C. and its destruction by Sargon II in 722 B.C.; in the excavations between 1931 and 1935, six periods are identified covering this period of 160 years, from the foundation by Omri in Period I to the Assyrian destruction of the Period VI buildings. The main difficulty that Dr. Aharoni and Mrs. Amiran met is the undoubtedly close connection of the pottery from the Hazor Solomonic Stratum X and that of the Samaria Omrid Period I. They also suggest other fairly drastic alterations to the Samaria chronology.

The difficulties arise partly from differences of method and partly from correlations which seem frankly to be erroneous. In the Samaria excavations, the British method was followed, by which the pottery and other finds ascribed to a structural period are those actually associated with the building operation, from the foundation trenches, floor make-up and so on. Admittedly such fills will include earlier, derived, material, together with that dropped by the builders, but it is a commonplace of British archaeology that a building is dated by the latest object in its building deposits. The method at Hazor and most other Near Eastern sites is different. The material assigned to a stratum is that above its floors. There are two objections to this. In the absence of any published sections observed and drawn in the field (as distinct from schematic ones built-up from a collection of

⁵ pp. 200–204.

⁷ I.E.J. 8. A New Scheme for the Sub-Division of the Iron Age in Palestine.

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theodolite levels) at Hazor, there is no means of telling whether the objects come from one or more successive occupation levels, from destruction debris or from subsequent robber disturbance. There is no evidence as to how the objects from its construction levels are ascribed; presumably they are just incorporated in the material belonging to the lower stratum. Secondly, it has been emphasised by many excavators, for instance Professor Albright⁸ that the majority of the finds on the floor of a building represent its final use. Professor Albright's excavations at Tell Beit Mirsim provide an excellent example. Stratum B3 was destroyed c. 930 B.C. It was immediately succeeded by Stratum A, which was destroyed in 588 B.C. Almost all the pottery is late 7th— early 6th century. Therefore if Stratum A is dated by its latest pottery, it is 6th century B.C. In exactly the same way Hazor Stratum X is not dated by the pottery published as Stratum X, but this provides an indication for the time Stratum X continued in use, and a terminus post for the building of Stratum IX. There is no great harm in this, provided it is understood how the evidence is to be interpreted. But the converse is extremely important. Hazor Stratum X is Solomonic, but the pottery from Stratum X is not Solomonic, or at least not necessarily so; its date depends on the date of the construction of IX. Dr. Aharoni and Mrs. Amiran will fall into serious error if they try to pour everything into a mould on the assumption that the Stratum X pottery is Solomonic.

The steps they take in this pouring process are shown by the treatment of the Samaria evidence. The excavators' interpretation of the Samaria evidence confirmed the literary record that the site to which Omri transferred his capital was a virgin one, unoccupied since the end of the fourth millennium B.C. Its grandiose lay-out was based on bedrock and make-up of the accompanying floors rested directly on the rock. In this make-up there was a fair amount of pottery. This closely resembled that of Hazor X. Dr. Aharoni and Mrs Amiran seek to explain this by denying that this can have been the pottery brought by the population transferred by Omri from Tirzah (with which the evidence of Tell el Far'ah perfectly agrees¹⁰), and by claiming that there must have been an existing settlement at Samaria which was 'completely razed' by Omri. It can categorically be said that this was not so, for the sections observed and measured in the field in a wide strip right across the summit showed no trace at all of any such hypothetical settlement. If any previous deposits had existed, it is conceivable that in levelling operations the builders might have removed them on the crest, but certainly not where the rock started to fall to north and south, where in fact the builders terraced up and

⁸ A.A.S.O.R. XII, p. 76, A.A.S.O.R. XXI-XXII, p. 2, note 1.

⁹ S.S.I.

¹⁰ S.S. III, pp. 208-9, R.B. LXII

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would have razed nothing. But even if it is claimed that there had been faulty observation in this matter, there is other conclusive evidence. Dr. Aharoni and Mrs. Amiran assert that the material beneath a floor really belongs to the preceding building stage. Samaria Period I is followed by Period II, structurally quite distinct, in which important Period I walls were partially buried by new terracingsup. The pottery from these new deposits, which on the thesis just mentioned, would have been in use in Period I, is identical with that beneath the Period I floors. It can therefore confidently be asserted that the Samaria Period I—II pottery represents that in use c.890-870 B.C.

This need not really be disturbing from the point of the Hazor evidence, once it is recognised that the X pottery is not *ipso facto* Solomonic.¹¹ The X buildings may have had a long life, as is also probably the case with the comparable plan at Megiddo.

The building of Hazor Stratum IX is probably in fact approximately contemporary with Samaria I, instead of its occupation being late 10-early 9th century, as suggested, for material from its occupation levels seems to be similar to that dating the construction of the Samaria Period III buildings. In this a second point of disagreement with Dr. Aharoni and Mrs. Amiran is reached, that of the evidence for correlation of different deposits. Samaria I-II having been dismissed as irrelevant, Samaria III is said to be equivalent to Hazor VIII, on the grounds that 'the bowls of Samaria III are identical with Hazor VIII,' When a detailed comparison is made, this proves to be a very surprising statement. Hazor-Samaria comparisons are tabulated in the Appendix, Table A. The striking point is that Samaria III has no examples of the carinated bowls with out-turned rims which are common in Hazor VIII but at Samaria start only in IV, of the bowls with curved wall and rim tending to be thickened, or of the craters, while Hazor VIII has no examples of the characteristic Samaria III form, the saucer with splaying wall and ring base, which has only a short chronological range. Therefore, though there are some parallels, to say that the bowls of the two groups are identical is completely incorrect. On the other hand the parallels between Samaria III and Hazor IX seem to be distinctly better, including the appearance of two examples of the Samaria III saucers. Moreover, the description of the ware of the bowls seems to fit better. A noticeable feature of the Samaria III ware was that many bowls had a marked black or grey core, seven out of nineteen examples, as against two out of thirteen in IV. In Hazor IX, five out of twelve are similarly unevenly fired, while in Hazor VIII there are sixteen out of fifty-eight, of which the greater number are craters.

The bulk of the Stratum X material is published in *Hazor* III-IV, of which the plates but not the text have appeared; the distinction between XB and XA is therefore not yet clear. The sherds published in *Hazor* II are a rather heterogeneous lot, and an examination of the find-spots on the plan suggests that scarcely one comes from a position where floors are intact and which is therefore probably free from disturbance.

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It is difficult to compare the burnishing technique, as many of the Hazor examples are described simply as burnished, and whether by hand or on the wheel is not indicated. It is difficult to use the term 'Samarian' ware as identification, as unfortunately different people use it differently. The Hazor excavators do not confine it to the fine-ware burnished bowls, and if there is any sense at all in using it for the thicker bowls, it is for the burnished bowls of Samaria IV-VI, which are completely different from those of the earlier periods. As regards Hazor VIII, Hazor II Pl. XV, 1-38 are all called 'Samarian', which would associate the level with Samaria IV at earliest, and the forms are those of Samaria IV-VI, not III.

The later levels also fit this downward adjustment of the Hazor correlation. Dr. Aharoni and Mrs. Amiran confirm¹² the distinction between the early and late type of shallow cooking pot with the short, thick, necked rim made in the Samaria report.¹³ At Hazor the early type is found exclusively in VIII, the late is predominant in VII. At Samaria, the late type appears in IV, but is still in a minority (two out of fourteen published examples). On this evidence, the pottery of Samaria IV comes between that of Hazor VIII and VII. The carinated bowl with out-turned rim found in Hazor VIII first appears in Samaria IV. Water decanters first appear in Hazor VII, and the first appearance of this typical ware at Samaria is in V.¹⁴

The correlation of Hazor and Samaria can therefore be tabulated thus and, in anticipation, the correlations suggested with Megiddo are added.

HAZOR		SAMARIA	MEGIDDO
2nd half 10th century	Building X Pottery X	Pottery I 880 BC Building I Pottery II	
	Building IX	Building II	Pottery V Building IV
	Pottery IX Building VIII Pottery VIII	Pottery III Building III	
	Building VII Pottery VII Building VI Pottery VI	Pottery IV Building IV Pottery V Building V	Pottery IV
732 BC	Building V Pottery V	Pottery VI Building VI 722 BC	Building III Pottery III

I.E.J. 8, pp. 174-5.
 S.S. III, p. 117.
 S.S. III, p. 95.

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The next problem is to establish the relation of the Megiddo strata to the phases at the other two sites. In the first place, it is necessary to analyse as far as possible what structures are to be assigned to the successive building periods.

The principal structures of Stratum IV are the stables, conclusively shown by Dr. Yadin to be later than the casemate wall and associated northern fort. The evidence for suggesting that the construction date of these was slightly later than that of Samaria III is set out in the Samaria report. 15 'Palace' 1723, however, for the construction of which there was no dating evidence, must now be assigned to the earlier period as the southern part of the same system as the casemate wall and northern fort. With it presumably goes the adjacent building 1482 on the same orientation, which was partly abolished by the southern stables. 'Palace' 1723 is surrounded by an enclosure wall orientated on it, and a courtyard with a hard limeplaster floor. This must certainly have been in use with it, but it seems very probable that it was a later addition. Its structure is the very individual one that characterises the Stratum IV buildings, the stables, building 338 and building 355. In all cases only the foundations survive. They are built mainly of rather rough rubble, with at intervals piers of ashlar, of three courses, a stretcher below a header and then another stretcher, or header, stretcher, header. The individual stones are identical with those of Samaria periods I and II, where they can be ascribed to Phoenician workmanship. 16 But an examination of the photographs, especially Megiddo I Figs. 13, 52, 60, 62, 65 makes it almost certain that in the Megiddo piers the ashlars are re-used.

At Samaria, ashlar with two types of dressing is used. In one, the face of the stone is dressed flat all over with very fine tooling, and the joints between the stones are exquisitely fine. It is found in the Period I terrace wall¹⁷ and the socalled Ahab building of the Harvard Expedition. 18 The second type has heavy and irregular bosses, with finely dressed margins on two or three sides only. It is found in the Period II casemates, the Middle Terrace wall where the Hellenistic tower is added to it, 19 and the southern wall of the eastern enclosure. 20 In the piers of the Megiddo structures, the two types are used indiscriminately. In building 338, in the pier at the south-east angle, 21 above a foundation course there is a bossed stone and above it two courses of flat-dressed stones, while in the piers in the south and east walls the corresponding courses are all of bossed stones. In Megiddo I Fig.

S.S. III, pp. 202–3.
 S.S. I, pp. 6–9.
 S.S. I, pl. XIII.
 Reisner et alii, Samaria, Vol. II, pl.

¹⁹ S.S. I, pls. XXIV, 2, XXV, 1. ²⁰ S.S. I, pl. XXXII. 21 M.I. Fig. 60.

60 and 65, corner pier, it can be seen that one of the flat dressed stones was certainly broken when used. Moreover, though the courses with the ashlar piers may have been above ground level outside the building, inside the building they were certainly foundational; in spite of this the finely dressed stones were used, though they would be quite out of place in foundations, and in Fig. 62 (though it is not very clear) it looks as though there is a bossed stone in a course above a finely-dressed stone. Everything suggests that the ashlars were derived from some earlier buildings, in which they had been in positions suited to their dressings. This probably applies to all the structures in which they were used, for none of the photographs suggest that the actual building is of the accuracy for which the dressing, of the whole face or the margins, was designed.

It therefore seems probable that the courtyard and enclosure wall surrounding 'Palace' 1723 was added in Stratum IV, at the same time as the stables were built, and that at this stage the whole of the summit of the hill was laid out as a royal quarter, in imitation of that of Samaria. The southern fort of the preceding lay-out ('Palace' 1723) remained in use, but the northern fort was, as Dr. Yadin has shown, abolished by the northern stables. It could have been from this that the ashlars were derived and from the part of building 1482 that was abolished by the southern stables, for there were fragments of dressed stones in position in the latter and the only two stones of the superstructure of 1723 that survived were of the bossed stones, so the northern fort was probably in similar masonry.²²

Stratum V, underlying this lay-out of public buildings, consisted of close-packed smallish buildings. In *Megiddo* I, no subdivisions of V are made, but in *Megiddo* II, two layers of buildings, virtually unrelated though of similar character, are distinguished, an upper layer VA, and a lower VB. On the assumption that Dr. Yadin is right (as he almost certainly is) in ascribing the 'Stratum IV' gate shown on plan *Megiddo* II, Fig. 389 to Stratum V, the buildings planned as Stratum VA on *Megiddo* II, Fig. 388 could perfectly well go with it, except that building 2096, which is built up against the gate, overlies the VA buildings. But as 2096 is clearly built against the offsets and insets of the town wall, it is later than the first stage of the gate to which the casemates are presumed to belong.

²² It should however be noted that the analysis made of the pottery from the 'IV Filling' in S.S. III pp. 202-3 would allow of building 1482 belonging to Stratum IV and therefore being added at the same time as the adjoining enclosure wall, for the pottery recorded from its fill includes some at least as late as Samaria III. This would agree with the evidence analysed in the same place that the pottery from the filling beneath the floor of the stable 1576 compound, which abolishes part of building 1482 includes forms going down to the mid-8th century. It could therefore be that stable 1576 is a late addition to the IV layout. But since the structure of 1482 is similar to that of 'Palace' 1723, and that of stable 1576 is similar to that of the courtyard wall of the Palace, it is on the whole more probable that the the later pottery is derived from intrusions, as was concluded in S.S. III p. 203; of the existence of intrusions there is ample evidence in the plan, M.I. Fig. 34 from the gaps in the floors and walls. The Megiddo excavation methods were not such that material from these areas would have been excluded.

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The pottery in these buildings, where in a number of cases there were intact floors with a considerable number of vessels in position on the floor, provides evidence for the pottery in use in the last stage of the rooms. If this is tabulated (see Appendix, Table 3) with the pottery that G. E. Wright suggested²³ proved that buildings 10 and 51 of Megiddo I, Fig. 6 belonged to a later stage of the Stratum V of Megiddo I, it will be seen that the assemblages are virtually identical. The contents of those other rooms published on the same plan as 10 and 51 seem again to be the same (Appendix, Table 3, Room 412, 398) and these buildings therefore continued in use with the rebuilding that the plan suggests in the case of 10 and 51. Finally, the rather limited amount of pottery in the Stratum V buildings beneath the courtvard of 'Palace' 1723 seems to be similar. There is no reason why these buildings should not be contemporary with 1723. They do not align on it, but 1723 comes in fact in between two separate orientations of the smaller buildings. There is a gap on the Stratum V plan (Megiddo I, Fig. 5) in the position of 1723. This might be because the latter's foundations are deep, but in the schematic sections on Megiddo I, Fig. 35, no walls of Stratum V are in fact shown within the area of 1723, which would be a coincidence if they had existed here, and it seems very probable that the smaller buildings were grouped around the larger.

The lay-out immediately preceding that of the royal quarter of Stratum IV, was thus a casemate wall associated with a magnificent gateway and two substantial forts, while the rest of the area was closely built up with fairly small buildings. The pottery from the final use of these buildings seems to be close to that of Hazor IX, and from the comparisons with Samaria it has been suggested that it comes down to c. 850 B.C., ²⁴ when Stratum V was succeeded by Stratum IVA.

The question that is not yet settled is whether this was the lay-out of Solomonic Megiddo. It has been shown that the Solomonic defences were in use in this period. But it has not yet been established that this was the earliest town belonging to these defences. In Dr. Yadin's interim account²⁵ of the discovery of the casemate wall and the northern fort, it was stated that in a room of the fort was discovered typical Solomonic pottery, by which is presumably meant pottery comparable with that of Megiddo VA, and therefore dating down to c 850 B.C. If this is the case, Solomonic Megiddo must have had a long life. This is not impossible. But it is at least worth suggesting that the original structures belonging to the Solomonic defences were those planned in VB in Megiddo II, together with the obviously earlier elements in the Megiddo I Stratum V plans. VB would then be the town destroyed by Sheshanq I c. 930 B.C.; in the VA reconstruction,

²³ A.A.S.O.R. XXI-XXII, pp. 29-30.

²⁴ S.S. III, p. 203.

²⁵ Biblical Archaeologist, 1960.

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the town would have been built completely afresh, but the defences restored on the same lines. This would place Megiddo on the same footing as Hazor, as a town refounded by Solomon after a period of abandonment. It would account for the fact that the capture of Megiddo by the Israelites is never mentioned in the Bible, which would be a curious omission in view of the importance of the site; if, on the other hand, it was never conquered, but an abandoned site was simply reoccupied, the omission is explained.

The archaeology of Hazor and Megiddo is vital to an understanding of the history of the central part of the Iron Age in Palestine. It is very much to be hoped that further work will be done by Dr. Yadin and his colleagues to settle some of the points raised in this article.

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APPENDIX

	Vol. I	ZOR Vol. II	SAM/ Vol.	Ш
TABLE 1	Stratı Pl.	ım VIII Pl.	Period III Fig.	Period IV Fig.
Bowls	11.	11.	Tig.	Tig.
Carinated, with flaring upper wall	XLVII, 1	LIII, 1-4, 20 LV, 13, 17	4. 11–12	6. 4–5
Carinated, shallow, short upper wall		LIII, 7–11, 18 LV. 19–20	4. 7	6. 6-7
Rounded carination, deep, plain rim			4. 3-4	
Carinated, rim thickened and out-turned	XLVII, 15–17, 19	LIII, 13–17, 35–36 LIV, 10 LV, 24–26, 35, 40		7. 1
Curved wall, thickened				
out-turned, rim	XLVII, 8-10	LIV, 1–9, 11 – 14		
Curved wall, thickened				
rim bevelled externally Splaying wall, angle	XLVII, 4	LIII, 24–28		
just below exterior rim		LIII, 30–31		
Hemispherical		LV, 7–11, 28, 31		
Crater, wall inclined in, thickened or flanged rim	XLVII, 25-37	LVI, 1-2, 4, 6, 8-1	4	6. 15–16
Necked craters		LVI, 3, 5		
Saucers, plain side, disk base		LIII, 32		(1 0
Saucers, plain side,	VIVII 7			6. 1–2 7. 2–7
flat or concave base Saucers, splaying wall, ring base	XLVII, 7		4. 14-19	

	HA	SAMARIA				
	Vol. I	Vol. II	V	ol. III		
TABLE 2	Strat	Per	Period III			
	Pl.	Pl.		Fig.		
Bowls						
Carinated, with flaring upper wall	XLV, 1	LII, 1, 8	cf.	4. 11		
Splaying walls, incurved rim	· XLV, 5		cf.	4. 1		
Saucer, splaying wall,		LII, 3	cf.	4. 17		
ring base	XLV, 9		cf.	4. 19		
Fine bowl, curved walls	XLV, 13		cf.	4. 9		

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TABLE 3. SELECTED GROUPS FROM MEGIDDO V, VA, VB

	S	iddo I A Stratum ' Room 412	V		iddo I Ar Stratum V Rooms 1700 1702	7	St	ratum V	Α	Megiddo II Stratum VB
Bowls				1714						
Deep, rounded rim 1.29,110 1.29,111 1.32,168 1.31,153	2 - 1 -	1	1 - - 1	1	- - -	- - -	1 - -	- - -	1	- - - -
Rounded angle, ring base I.30.116	i		_			nuck.	1		1	_
Carinated, flat or disk base 1.28.99 1.30.133 1.30.132 1.30.131 1.30.119 II.89.12 1.30.121 1.30.122 1.30.123 1.30.124 Carinated, ring base II.89.10 II.87.21 1.30.115 1.30.120 1.30.126 1.28.98 1.28.97	1 1 2 1 3 - 1 6 1 1 1 1 1 1	1	1 1 1 - 1	1	1	-			1 	1
I.28.102 Carinated, flattened rim I.89.9 I.30.130 I.28.106 I.28.101	- 1 1		- - 1 1	- - - -		- - -	- - -	- - - -	2	
Carinated, high base I.30.127	1	1		_	_	_	-	_	_	_
Splaying sides with ring base II.89.8 I.30.135	same t		-	-	_	<u>-</u> 1			1 -	ener Maye
Deep bowls, 2-handled I.29.112	1	-	-	-	1,	_	_	_	1	-
Round based I.31,143 II.89,11 II.89,13 I.28,93B	1 - - -	- - 1	- - 1			- - -	- - - -	1 -	1 1 1	-
Chalice	-	***	-	_	-	gen-	-		1.	-

SELECTED GROUPS FROM MEGIDDO V, VA, VB

		iddo I A Stratum			ddo I Ai tratum V			do II Ar ratum V		Megiddo II
	B'ldg. 10	Room 412	Room 398	Rooms 1708 1671	Rooms 1700 1702	Room 1706	Rooms 2100 2102	Room 2111	Room 2081	Stratum VB
Jugs				1714	1702		2102			
Wide, round mouth,										
round base				1						
I.7.166 II.88.1	_	_	_	1	_	_	_	_	1	_
I.5.119	1	-	-		-	-	-	-	_	
I.5.112					-		1	~		-
Similar, ring base I.8.178	1		_	-	-		-		1	~
Narrow round neck, round base										
I,7,170	_	_			_		yes.	1	~	
Wide, round mouth,										
everted rim										
I.7.168	~	1				-		_ =1	, mar.	-
Ridged lip, ring base II.84.4	_	_	_		_			_	1	_
Handle to thickened rim									•	
I.6.156	_	-	_	-	1	_	_	ates	1	_
1.6.160				1	main.	***	-		400	-
Narrow neck, ridged neck I.7.174	1									
I.6.146	1	_	_	_	alleria.	_	_		_	
I.6.147	1	~	-	-	_	-		-	-	-
I.7.171	1	-		-	-		-	-	_	_
Round neck, bands of decoration on body										
I.6.154	1			1	1	_	-	-		-
Jars										
Round neck, two handles										
I.20.115	_		1	-					i.	-
Ridged neck									1	
II.89.1 I.22.119	_		_					_	1	***
Similar, plain neck										
I.19.105	-	-	-	-	-	-	-	-	1	-
Jar with side spout							1			
I.19.106	1 2	_		_		_	1	_	_	-
Handleless jar	2		artin		halos	_				-
Pyxis							1		4 .	
I.19.95 II.89.5	_	-	~		_	_	1		1	~
II.87.20	_	_	_			_	_	- Mary	~	1
Storage Jars										
I.20.119	1	1	1	_	_	_	_	_	-	_
I.21.123	3 2	-	_	-	-	1	1	-	-	-
I.20,120	2	-	1	_	1			-	-	_

SELECTED GROUPS FROM MEGIDDO V, VA, VB

	S	iddo I A	V		iddo I A Stratum	V	St	ratum V	A	Megiddo .II
	B'ldg. 10	Room 412	Room 398	Rooms 1708	Rooms 1700	Room 1706	Rooms 2100	Room 2111	Room 2081	Stratum VB
	10	712	370	1671	1702	1700	2102	2111	2001	10
Storage Jars—cont.				1714						
I.20,121 I.21,122	2 2	-	_	-	_	1	_	_	-	
I.21.124	1	1	1	_	_	_	_	_	_	_
Juglets										
Round bottom, ridged rim										
I.5.135	- 1	1	-	-	-	-	-	_	1	
I.5.134 II.88.16	_		_	_	_	_	1	_	1	_
II.87.15	_	-	-	_	_	-	_	_	_	1
High neck, stump or disk base			4							
I.5.124 I.5,125	1 2	100	1	_	-	_		1	4	
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High neck, round base										
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П.88,11		-	_	_	_	-	_	-	i	_
High neck, flat base										
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Dipper Juglets Pinched mouth										
I.5.142	_	_	_	_	_	_	1	_		_
I.5.141		-	-	-	-	-	_	-	1	-
I.5.140 II.87.14	-	_	-	1	_	_	-	-		_ 1
Round mouth					_	_	_	_	_	1
I.5.121	1		1	-	_		1	~	1	-
I.5.120	-	-		1	-	-	-	-	1	-
Amphoriscos										
I.19.114	1	~	~	-	-	-		-		-
Lamps										
I.38.14 I.37.17	_	1	_	_	****	_	_	-	1	_
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Jars										
П.89.7	-	-	-	_	-	-	1	-	-	-
Bowls II.90.2							,		2	
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II.90.3	-	-	_	-	-	-	-	-	1	-
I.29.107	-	-	1	14	-	-	-	-	-	-
Jug	-	-	-	-	-	-	-	-	1	-

Department of Western Asiatic Archaeology 1947–62: Retrospect

by M. E. L. MALLOWAN

This is an appropriate moment at which to take leave of the Institute and the Department of Western Asiatic Archaeology with which I have been associated for fifteen years¹, for it happens that almost concurrently the other members of the Department's teaching staff have left it—Miss K. M. Kenyon and Mrs. K. R. Maxwell-Hyslop.

As is well known, Miss Kenyon was a founder member of the Institute and served it with distinction for the twenty-seven years of its lifetime², and Mrs. Maxwell-Hyslop has been associated, first as a student and then as a teacher, for almost as long.

We are glad to know that among our successors is Miss Barbara Parker³ who, together with Mrs Maxwell-Hyslop, was the first candidate to sit for the Diploma in Western Asiatic Archaeology, and is already engaged in the teaching of it.

To Mr P. J. Parr⁴, successor to Miss Kenyon and responsible for the teaching of the archaeology of Palestine and the curatorship of the Petrie collections, we extend our warmest good wishes. The Institute is to be congratulated on finding as my successor Professor Seton Lloyd, who has rendered the most distinguished services to archaeology in Iraq and in Anatolia.

In a very brief review of the Department's work it would perhaps be fair—at all events on my part—to say how much we ought to have done that we have not done, but it seems preferable to end on a more joyful note and to leave to our successors the burden of making good our omissions. We have seen a steady and healthy growth in all the Department's activities. I well remember that when I joined in 1947 the number of pupils studying the archaeology of Western Asia amounted to one, but there is consolation in remembering that this student-Miss Margaret Munn-Rankin-has had a distinguished career and for many years has, at the University of Cambridge,

¹ My Inaugural Lecture, entitled 'The Legacy of Asia', was delivered on October 16th, 1947, and was published in the Fourth Annual Report of the London University Institute of Archaeology (1947).

Miss Kenyon was officially appointed to a lectureship in Palestinian Archaeology and Curator of the Petrie collection in 1947 on relinquishment of her appointment as Secretary to the Institute.

After retirement from ten years service as Secretary-Librarian to the British School of Archaeology in Iraq

After retirement from the office of Assistant Director, British School of Archaeology in Jerusalem.

carried the burden of teaching Western Asiatic archaeology as well as ancient history.

Little by little the number of students has increased so that during my last academic year there were sixteen, most of whom were engaged in special studies, either for Diplomas or for Higher Degrees; and departmental lectures which in the early years were attended by three or four persons at the most, now have between twenty and thirty for audience.

Similarly, our study-collections have grown beyond recognition. Now, in addition to the great body of material from many dozens of sites in Palestine we have a copious type-series of pottery and sherds from Mesopotamia, Syria, Anatolia, and the beginnings of an important collection from Iran, together with many varieties of metal objects, beads and figurines. These acquisitions have often been due to the personal activities of members within the Department; sometimes to students who have gone overseas and brought their tribute with them when allowed to do so. To those who are engaged in working for Academic Diplomas or writing theses this collection of material is a mine of information from which many additions to knowledge can be extracted. The business of charting, registration, and supplying up-to-date comment provides an admirable exercise for all who are engaged in these studies, and the principal seminar rooms are well adapted for this purpose.

Without doubt one of the most interesting features of teaching that comes the way of any who have the good fortune to be associated with our Department, is the opportunity it affords for close contact with young students and scholars not only from our own country but from overseas, and particularly from other countries in Europe and Western Asia. Looking back over the records we see that we have had foreigners of more than a dozen different nationalities in our classes, and some of them have subsequently done work of high distinction, and have been appointed to posts of great responsibility. Those from abroad mix on informal and friendly terms with their home-based fellow students in the Institute, and it is encouraging to see how often hard prejudices firmly held on arrival tend to disappear after easy familiarity within an atmosphere in which all are engaged on a common interest.

It is not always appreciated that a foreign student—and particularly an oriental—has to contend with numerous difficulties in making up his mind to study conscientiously in Europe. How many of us archaeologists in England would be prepared to go to a distant and totally different world overseas in order to learn an utterly unfamiliar oriental language—Arabic, Turkish, or Persian let us say—and pass an examination conducted in one of those languages at the end of two or three years, meanwhile having to adapt ourselves to a totally new

climate both physically and mentally? It takes at least a year for the foreign student to adjust himself to these difficulties, and sympathy with him is needed from all whose task it is to share in his training. Much patience has sometimes to be exercised, both on the part of the teacher and of the student, but it is wonderfully gratifying to see how often, after the first year, difficulties which at first appeared insuperable have been overcome. For the removal of these obstacles I believe that any personal attention given outside office hours is worth its weight in gold, and nothing can count for more than occasional private hospitality within the home. Here I wish to pay a tribute especially to the kindly and unobtrusive help that has so often been given to students beginning to find their feet in London, not only by our departmental staff, but also by Ione Gedye after a full day in the laboratories, and by Joan Taylor and Geraldine Talbot who have far outstripped their duties as librarians in offering guidance out of hours to our students and guests from abroad. A great effort is indeed needed by all who are engaged in this task, but the firm basis of friendship laid by these communications is of an incalculable value which goes far beyond the mere confines of archaeology.

It has to be remembered that many of our students have been attracted not only to this Department but to others within the Institute by the activities of our oriental Institutes and Schools overseas, and that the head of the Department and his colleagues must inevitably be much preoccupied with responsibilities and activities within those Institutes. This indeed has its disadvantages as well as its advantages, for it is impossible for any teaching member of our staff to be available for twelve months in the year within the Institute. But the study of archaeology cannot be kept alive by one who is physically confined to a chair, and we have to reckon that our oriental departments must accommodate their teaching to the exacting demands of travel and work overseas, and to the administrative duties which the Institutes abroad will continually require.

The teacher's lot is often a hard one, for since so many of those who come under him are thinking and writing in a language foreign to them, much more personal attention is needed, and has to be given, than to a home student. One particular problem that must concern us all is the difficulty of teaching the student from abroad how to write English. Although not equipped for this task we cannot wholly evade it, and in spite of the gallant efforts of the British Council which has often come to our rescue, the effort to battle with participles, with active and passive voices, with tenses and the rest is both distracting and enervating. It does not help to say that the foreign student should hold some certificate of competence in the language before arriving in this country; he often does, and it may be no more reliable than his vaccination paper. Nothing can take the place of learning

English in the home, and this advantage is now of the greatest rarity. It would in my view be highly desirable to have attached to the Institute an English teacher who could, during their first year, attend to their special needs.

Many other demands claim the teacher's time. He has, for instance, to attend meetings of those boards and committees associated with the administrative machine, and to play his part in the editing, writing and production of periodicals which record and publicise the work being done overseas. We may mention two important journals in this context: the first, the *Palestine Exploration Quarterly* of which Miss Kenyon is one of the pillars, has been the source of many preliminary reports on the great excavations for which she has been responsible. I refer first and foremost to the work at Jericho with which the Department has been proud to be associated. The account of it is now coming out in a series of definitive volumes, and these have formed only one of Miss Kenyon's innumerable activities. It has long been a mystery to me to know how she has found time to compete with her many obligations.

In addition we must add the name of Nimrud, of which the preliminary excavation reports have been published by me, and subsequently by Mr. David Oates, in successive numbers of the journal *Iraq* which reached its twenty-fifth volume in 1963. This journal, of which the head of the Department has been joint editor since he assumed office at the Institute, is our principal writing forum for Mesopotamian archaeology, and has gone hand in hand with the editing and publication of a series of Penguin archaeologies on Western Asia and allied topics, now numbering eleven volumes in all, and ranging from subjects such as Early Muslim architecture to the Hittites, Crete, the Greeks overseas, and prehistoric India.

The publication of learned periodicals, articles, reviews and books on which members of our Department are continuously engaged, has been closely connected with their activities as Directors of the Schools overseas—the British School of Archaeology in Jerusalem, and the British School of Archaeology in Iraq—above all with the expeditions to Jericho and to Nimrud, justly famous the world over for their contributions to prehistory, to the history of civilisation, and to the annals of art and architecture. We may look back with some pride on the Department's association with these sites and the more recent excavations at Jerusalem during the last decade. Incidentally, much valuable work has been done at the Institute on the conservation and restoration of objects from Nimrud and Jericho, notably the ivories from the former and skulls from the latter site, whilst the variety of materials acquired from both has been invaluable to the training of students in the handling of all kinds of oriental antiquities. Nor should we forget that in the years to come we may hope for a widening of the Department's

activities through the work of the newly founded British Institute of Persian Studies, of which I have the honour to be the first President.

We must not neglect, furthermore, to mention the authority which Mrs. Maxwell-Hyslop has acquired on the subject of ancient Asiatic metallurgy. Many articles written by her on tools, weapons, and implements from Western Asia in the course of her work at the Institute have become classical sources of reference, and her unrivalled knowledge in these matters has been used to the profit of students in widely scattered fields. Her projected book on Asiatic jewellery which demands travel far afield, both in Turkey and in Iran, is a work to which we eagerly look forward.

Looking back over archaeology during the period in which we have been at the Institute one has inevitably noticed new trends, more especially in the additions to the science of technology: not only methods of excavating, but methods of recording and conservation, of interpretation, of analysis have become more exactly scientific year after year, and the technological approach to archaeology absorbs more and more of the student's and of the teacher's time and thought. Students now have to spend far more time on practical work than ever before, but we must remember that this is only one of many aspects of archaeology, and we would wish in this short farewell article to plead that the ancient literary basis of our subject be not neglected, for with the multiplication of lectures and of demonstrations there is now a very real danger that the student may neglect reading and thinking for himself. Archaeology no less than any other study should enjoin its devotees to make a personal constructive effort to assimilate, interpret and enjoy knowledge. The acquisition of information is but the beginning of thought. The purpose of a University is to combine instruction with the incentive to learn, as well as to animate the student with enthusiasm.

The Asiatic Diplomas prescribed by our Department have primarily in mind a basis of education which assumes that some familiarity with ancient languages, history, literature and religion is inseparable from the study of oriental archaeology, and our new Diploma concerned with Iran, placed on the University books only this year, continues to recognise the value of a system which is intended for the broad education, not merely for the specialised cramming of a student. The wide scope of our syllabus has indeed its special difficulties, but they are worth surmounting, for it involves close contact with two other institutions within this University, namely the School of Oriental and African Studies and University College, where teachers of the relevant oriental languages and of ancient history are respectively situated. In this way we make use of the varied gifts which University teaching has to offer, and it is surely to the advantage of all our sciences and arts that we are able to enjoy the benefit of cross-fertilisation. For

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that reason alone I trust that, however inconvenient it may be at times to combine instruction at different colleges of the University, the necessity of making the effort as part of a sound general education will never be forgotten.

It is also my view that if, as we at present insist, the student acquires some elementary knowledge of the structure of an ancient oriental language, he is on the way to possessing an inestimable advantage when he comes to work in Western Asia; that is, he will have advanced half-way to learning one of the living languages which he will meet when he comes to excavate abroad. More than ever today workers from the West need to understand the mode of thought which governs the minds of those who live in the East if they are to cooperate successfully with them.

Finally, let us constantly bear in mind an important consequence of our extraordinary archaeological activity during the last century. The evidence from every excavation worth the name has been recorded in print; the literature is massive, the reading of it sometimes exciting, sometimes painful and difficult to digest. Indeed with the enormous increase not only of books, but of periodicals in all languages we now find a very real danger that additions to knowledge may be buried in a printed oblivion as fast as they are disinterred. It is the business of the teacher to constitute in himself a corporate body of knowledge and to transmit this to his successors, for otherwise, whatever our technical accomplishments may be, the pursuit of archaeology will become vain and frivolous.

M. E. L. MALLOWAN

Academic and other distinctions (since 1947)

D. Lit. (London), 1948; Fellow of the British Academy, 1954 (Vice-President 1960-61); Lucy Wharton Drexel Gold Medal, University of Pennsylvania, 1957; C.B.E., 1960; Life Fellow of the Metropolitan Museum, New York, 1958; British Academy Schweich Lecturer on Assyria and the Old Testament, 1955; Corresponding Member of the Arab Academy, Baghdad, 1954; of the German Archaeological Institute, 1962; Director of the British School of Archaeology in Iraq, 1947-1961; Vice-Chairman, 1962—; President of the British Institute of Persian Studies, 1961; Senior Research Fellowship, All Souls College, Oxford, 1962; Professor Emeritus of Western Asiatic Archaeology in the University of London, 1963.

Articles in learned periodicals (since 1947)

Excavations at Brak and Chagar Bazar', *Iraq* 9 (1947) 1-266; 'A copper rein-ring from Southern Iraq', *Iraq* 10 (1948) 51-55; 'Reports on the Excavations at Nimrud', 1949-1950 (first two seasons), *Iraq* 12 (1950) 147-183; 1951 (third season), *Iraq* 14 (1952) 1-23; 1952 (fourth season), *Iraq* 15 (1953) 1-42; 1953 (fifth season), *Iraq* 16 (1954) 59-163; 1955 (sixth season), *Iraq* 18 (1956) 1-21; 1956 (seventh season), *Iraq* 19 (1957) 1-25; 1957 (eighth season), *Iraq* 20 (1958) 101-108; 1958 (ninth season), *Iraq* 21 (1959) 93-97. 'Ivories from the N.W. Palace, Nimrud, 1949-1950', *Iraq* 13 (1951) 1-20; 1951-1952, *Iraq* 14 (1952) 45-53. 'Memories of Ur', (In memory of Sir Leonard Woolley), *Iraq* 22 (1960), 1-19.

DEPARTMENT OF WESTERN ASIATIC ARCHAEOLOGY 1947-63: RETROSPECT

Articles on various subjects for *The Encyclopaedia Britannica* (1961–2), and for *Chambers Encyclopaedia*; twenty-one articles on Nimrud for *The Illustrated London News*, 1950–60; 22, 29 July 1950; 28 July, 4 August 1951; 9, 16, 23 August 1952; 8, 15, 22 August 1953; 21, 28 January 1956; 15 June, 23, 30 November, 7 December 1957; 17 January 1959; 3, 17, 30 January, 25 June, 1960.

Reviews of various books in Antiquity, The Antiquaries Journal, The Scientific American, Nature. Obituary notice on Sir Leonard Woolley for The Times, 22 February, 1960 and for The Dictionary of National Biography, 1962.

Books

Twenty-five Years of Mesopotamian Discovery (British School of Archaeology in Iraq 1956), 88 pp., 1 pl., 18 figs. Chapter III on 'The Birth of Written History', in *The Dawn of Civilisation* (Thames and Hudson, 1961), 65–96:

Editorial

Editor of the Asiatic and Mediterranean series of Penguin Books since 1947 and of Iraq from Vol. 11 onwards.

K. M. KENYON

Academic and other distinctions

M.A., D.Lit., L.H.D., F.B.A., F.S.A.; C.B.E. (1954); Lecturer in Palestinian Archaeology, University of London, Institute of Archaeology, since 1948; Director, British School of Archaeology in Jerusalem, since 1951; Assistant at excavations in British Association's expedition to Zimbabwe, S. Rhodesia, 1929, Verulamium, 1930–35, Joint Expedition to Samaria, Palestine, 1931–34; Director, excavations at Jewry Wall site, Leicester, 1936–39; Viroconium, Shropshire, 1936–37; The Wrekin, Shropshire, 1939; Southwark, 1945–48; Breedon-on-the-Hill, Leicestershire, 1946; Sutton Walls, Herefordshire, 1948–51; Sabratha, Tripolitania, 1948–49, –51; Jericho, Jordan, 1952–58; Secretary, University of London, Institute of Archaeology, 1935–48; acting Director, 1942–46; Secretary, Council for British Archaeology, 1944–49; Ethel M. Wood Lecturer, 1958, 'Archaeology and the Old Testament'; Norton Lecturer, Archaeological Institute of America, 1959; Hon. Fellow, Somerville College, 1960; Principal of St. Hugh's College, Oxford, 1962–

Articles in learned periodicals

'The Roman Theatre at Verulamium, St. Albans', Archaeologia 84, (1935), 213-261; 'Excavations at Viroconium 1936-37' Archaeologia 88, (1938), 175-227; 'Excavation Methods in Palestine', Palestine Exploration Quarterly (1939), 29-40; 'Excavations on the Wrekin, Shropshire 1939', Archaeological Journal 99, (1943), 99-107; 'Excavations at Breedon-on-the-Hill, Leicestershire, 1946', Trans. Leic. Arch. Soc. (1950), 17-82; 'Palestinian Excavations', Antiquity 24, (1950), 196-199; 'Early Jericho', Antiquity 26, (1952), 116-22; 'A Survey of the evidence concerning the chronology and origins of Iron Age A in Southern and Midland Britain', Annual Report of the Institute of Archaeology 8, (1952), 29-78; 'Some Notes on the history of Jericho in the second millennium B.C.', Palestine Exploration Quarterly (1951), 101-138; 'Excavations at Jericho, 1952-1958', Palestine Exploration Quarterly (1952), 62-82; (1953), 81-96; (1954), 45-63; (1955), 108-17; (1956), 67-82; (1957), 101-10; (1960), 108-13; 'Jericho gives up its secrets', National Geographic Magazine (1953), 853-70; 'Excavations at Jericho', Journal of the Royal Anthropological Institute 84, (1954), 103-10; 'Excavations at Sutton Walls, Herefordshire', Arch. J., 110, (1954) 1-87; 'A crescentic axe-head from Jericho and a group of weapons from Tell el Hesi', Institute of Archaeology Annual Report 11, (1955), 10-18; 'Jericho and its setting in Near Eastern History', Antiquity 30, (1956), 184-95; 'Tombs of the Intermediate Early Bronze-Middle Bronze Age at T.Ajjul', Annual of the Department of Antiquities of Jordan 3, (1956), 41-55; 'Reply to Braidwood', Antiquity 30, (1957), 82-4; 'Some notes on the early and middle Bronze Age strata of Megiddo', Eretz-Israel V, (1958),

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51-60: 'Some observations on the beginning of settlement in the Near East', Journal of the Royal Anthropological Institute 89, (1959), 33-43; 'Earliest Jericho', Antiquity 33, (1959), 4-9; 'Jericho and the Origins of Agriculture', Advancement of Science, 17 (1960), 118-121.

Reports and Books

Excavations at the Jewry Wall, Leicester, Research Report of the Society of Antiquaries, 1948, 286 pp., 33 pls., 100 figs.; with J. W. Crowfoot and others.

Samaria I, The Buildings, Palestine Exploration Fund, 1942, 139 pp., 89 pls., 55 figs.

Samaria III, The Objects, Palestine Exploration Fund, 1957, 478 pp., 27 pls., 119 figs; with J. W. Crowfoot and others.

Beginning in Archaeology, Phoenix, 1952, 2nd edition 1953, 3rd edition 1962, 217 pp., 11 pls., 14 figs.

Digging up Jericho, Benn, 1957, 287 pp., 65 pls., 18 figs.

Archaeology in the Holy Land, Benn, 1960, 363 pp., 56 pls., 66 figs.

Excavations at Jericho I, The tombs excavated in 1952-54, London, British School of Archaeology in Jerusalem, 1960, 583 pp., 43 pls., 230 figs.

K. R. MAXWELL-HYSLOP

Articles in learned periodicals

'Tenure of land in Babylonia and Assyria', Institute of Archaeology Occasional Paper No. 1 (1938), 7-30. Section in 'Excavations in Kusura near Afyon Karahisar' Part II, by Winifred Lamb, Archaeologia 87, (1938) 230-235, 'Daggers and Swords in Western Asia, A study from Prehistoric Times to 600 B.C.', Iraq 8, (1946), 90-125. 'Western Asiatic Shafthole Axes', Iraq 11, 1 (1949) 1-65. 'Two Western Asiatic Bronze Axeheads', Iraq 14, 1 (1952), 118-119. 'Bronze Lugged Axe or Adze Blades from Asia', Iraq 15, 1 (1953), 69-83. 'A Shafthole axe-pick from Khurab, Makran', Iraq 17, 1 (1955), 161. 'Urartian Bronzes' in Etruscan Tombs', Iraq 18, 2 (1956), 150-167. 'Notes on some distinctive types of Bronzes from Populonia, Etruria', Proc. Prehist. Soc. 12, (1956), 126-142. 'The Ur jewellery. A reassessment in the light of some recent discoveries', Iraq 22, (1960), 105-115. 'An Urartian archer on the Zinjirli chariot relief', Bulletin of the Institute of Archaeology, 2, (1960), 65-66. 'Bronzes from Iran in the collections of the Institute of Archaeology', *Iraq* 24, 2 (1962), 126-131.

Translation (with A. R. Maxwell-Hyslop) Everyday Life in Babylon and Assyria by G. Con-

tenau (Arnold, 1954) pp. 324.

Reviews of various books in Antiquaries Journal, Antiquity, Bulletin of School of Oriental and African Studies, Times Educational Supplement, Biblioteca Orientalis, Journal of Near Eastern Studies, etc.

Egyptian Funerary Statuettes and the Solar Cult

by H. M. STEWART

On the sites of private tombs of the New Kingdom a type of statuette has been found representing the occupant, usually kneeling with his arms raised in an attitude of worship, and having before him a stela inscribed with a prayer to the sun-god. Such statuettes, which are normally of limestone or granite, and average about 35 cm. in height, have never been found in situ, but in painted and other representations of tombs similar objects appear to be shown occupying a niche in the brick pyramid which commonly formed part of the superstructure (Fig. 1). Perhaps imitating these sculptures, miniature figures kneeling in niches, but without stelae, were sometimes carved in the cap-stones of the pyramids. The statuettes, being on the entrance side of the tomb, would generally have faced approximately eastwards, and were in fact usually inscribed with prayers to the sun-god

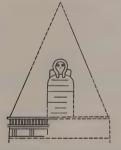


Fig. 1 After Davies, N. de G., Seven Private Tombs at Kurnah, (1948), pl. 26.

at his rising or throughout his daily course. Very rarely prayers to the setting sun occur,⁵ which suggest that figures may sometimes have occupied niches on two opposite sides of the pyramid, as they often did on the cap-stones.

Bruyère, B., Rapport sur les fouilles de Deir el-Médineh, 1923-4 (Cairo: Institut français d'archéologie orientale, 1925), 12 ff. Vandier, J., Manuel d'archéologie égyptienne, vol. 3 (La statuaire), (Paris, 1958) 471 ff.

Claims to the contrary are refuted in Hermann, A., Die Stelen der thebanischen Felsgräber der 18 Dynastie (Hamburg, 1940), 20 f.

Davies, N. M., 'Some representations of tombs from the Theban necropolis', J. Egyptian Archaeology, 24 (1938), 25 ff.

e.g. Berlin 2276: Anthes R., 'Die hohen Beamten namens Ptahmose in der 18 Dynastie', Zeitschrift für äg. Sprache, 72 (1936), 61 ff. pl. 3.

⁶ e.g. Brit. Mus. 22557: Edwards, I.E.S., Hieroglyphic texts from Egyptian stelae, etc., part 8 (London: B.M., 1939), 35, pl. 30.

H. M. STEWART

The pyramid itself, a solar cult-symbol of Heliopolitan origin, had been adopted by commoners from earlier royal tombs of a type given up by the pharaohs when, from the time of Tuthmosis I, they began to be buried in the Valley of the Kings. Since the end of the Old Kingdom the belief in a hereafter in the company of the sun-god Re⁴, which had been proper to the king as his doctrinal son, had been similarly democratised, and one may see in the increasing influence of the solar religion on the decoration of private tombs a continuation of the same trend.

This influence was exerted not only through royal example, but also through the identification of various local gods with the sun-god for reasons of prestige. Thus in Theban private tombs of the early Eighteenth Dynasty the owner was usually depicted on both thicknesses of the doorway, facing outwards, and presenting offerings to Amun, sometimes in the solarised form of Amen-Re', but at first without any special emphasis on his new rôle. Before the middle of the Eighteenth Dynasty, however, such scenes were relegated to the entrance-hall, and replaced by hymns and prayers to a predominantly solar Amen-Re' or more often simply to Re', a trend which was later strengthened by the differentiation of some doorway inscriptions to give hymns on one side to the rising sun and on the other to the setting sun. Such hymns became very popular, and their use spread to other parts of the tomb and to various items of the funerary equipment.

As in the case of the doorway inscriptions, texts on the earlier statuettes were sometimes less markedly solar. They were also generally quite short. The growing taste for and elaboration of solar hymns led, however, to an increasing demand on inscriptional space, which influenced the stylistic development of the statuettes. Very broadly they may be classified in four types, all of which already occurred before the middle of the Eighteenth Dynasty. The lists which follow are confined mainly to published examples of reasonably certain date.

TYPE I (PLATE XII, 1)

It would seem that in its original form the statuette did not hold a stela, ¹⁰ but simply had its arms raised in the conventional attitude of worship, the prayer or dedication being inscribed sometimes on the plain surface of the skirt (No. 1), but more often beginning on a filling-piece between the hands or forearms (probably intended to strengthen the sculpture), and continuing on the skirt. Statuettes of this type usually have the rounded features, plain coiffure exposing the ears, and long unpleated skirt, which were characteristic of early Eighteenth Dynasty

⁶ Schott, S., Das schöne Fest vom Wüstentale, (Mainz: Akademie der Wissenschaften und der Literatur, 1952), 12 f.

⁷ Tombs 11, 69, 84, 131.

⁸ Normal from about the time of Amenophis III.

⁹ Tombs 31, 48, 49.

The back plinth, however, sometimes had the form of a stela (Nos. 1-3).

EGYPTIAN FUNERARY STATUETTES AND THE SOLAR CULT

statuary.¹¹ Inscriptional confirmation of such a date is provided in example No. 1, which mentions the owner's brother, 'Akheperkare', named presumably after the reigning pharaoh, Tuthmosis I, whose prenomen this was.

Evidently modelled upon the same type is a later statuette¹² belonging to an individual named Sethi, and dating to about the beginning of the Nineteenth Dynasty. It has been rendered in an archaistic style reminiscent of the early Eighteenth Dynasty, but differs from examples of that period in having separate fillings (uninscribed) on each side between the fore- and upper-arms, instead of a single filling between the forearms.

	MUSEUM	DATE	PUBLICATION
(1)	Norwich 28.93.925	Tuthmosis I- Hatshepsut	Gardiner, A. H., <i>J. Eg. Arch.</i> 6 (1920), 212 f., pl. 22. Aldred, C., <i>New Kingdom Art</i> , 1st ed., (London, 1951) pl. 42. Vandier, J., <i>Manuel d'archéologie égyptienne</i> , 3 (La statuaire) 679.
(2)	Edinburgh 1885.137	Early 18th Dyn.	Vandier, op. cit., 668, pl. 160 (6).
(3)	Brit. Mus. 1735 (=pl. XII, 1) ¹³	Early 18th Dyn.	Edwards, I. E. S., <i>Hieroglyphic texts from Egyptian Stelae</i> , etc. part 8 (London, B.M., 1939) 51, pl. 43.
(4)	Leyden D 51	Early 18th Dyn.	Leemans, C., Aeg. Monumenten van het Nederlandsche Museum (Leyden, 1846), vol. 2, pl. 13; Leemans, Descr. raisonnée (Leyden, 1840), 54.

TYPE II (PLATE XII, 2)

The device of dividing the inscription between two planes was evidently unsatisfactory, and in some statuettes dating to about the time of Tuthmosis III the filling between the arms was prolonged to provide a single stela-like surface extending to the thighs, the palms of the raised hands being set within it.

	MUSEUM; PROVENANCE (WHERE KNOWN)	DATE	PUBLICATION
(1)	Cairo 42120; Thebes	Tuthmosis III	Legrain, G., Cat. gén. du Musée du Caire, Statues et statuettes (Cairo, 1906), vol. 1, pl. 70. Vandier, op. cit., 661.
(2)	Louvre A 79	Early 18th Dyn.	Vandier, op. cit., 672, pl. 160 (4).
(3)	Brit. Mus. 48033 (=pl. XII, 2) ¹³	Early 18th Dyn.	Edwards, op. cit., 36, pl. 31. Vandier, op. cit., 652.
(4)	Copenhagen AEIN 667	Early 18th Dyn.	Koefoed-Petersen, O., Glyptothèque Ny Carls- berg, Cat. des statuettes égyptiennes (Copen-
	Vandier, op. cit., 503.	(62 -1.161(2)	hagen, 1950), pl. 66. Vandier, op. cit., 667.

¹² Brooklyn 37.263E: Vandier, op. cit., 653, pl. 161 (2).

¹³ Reproduced by courtesy of the Trustees of the British Museum.

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TYPE III (PLATE XII, 3)

Before the end of the reign of Tuthmosis III the inscribed surface had developed into an actual stela, supported at the upper edge by the hands, and with the lower edge resting on the thighs or more rarely on the knees (No. 1), partly merged with them. The stela, usually round-topped, often contained in the arch conventional funerary motifs (wedjat-eyes etc.) such as occurred on ordinary funerary stelae. Although this type of statuette was transitional and soon to be replaced, it sometimes reappeared in archaistic sculpture of the Late Period. 15

	MUSEUM; PROVENANCE (WHERE KNOWN)	DATE	PUBLICATION
(1)	Edinburgh 1910.75; Thebes	Tuthmosis III	Aldred, op. cit., pl. 43. Vandier, op. cit., 668, pl. 160 (3).
(2)	Cairo NE XVI (=pl. XII, 3); Gebel Sedment, Fayum	Tuthmosis III(?)	Petrie, W.M.F., Sedment (London: Brit. School of Arch. in Egypt, 1924) II, 23 f., pl. 49 (3). Vandier, op. cit., 664.
(3)	Chicago NHM 88906	Tuthmosis III-IV	Vandier, op. cit., 665, pl. 159 (4).
(4)	Philadelphia L.55.212	Tuthmosis III-IV	Vandier, op. cit., 679, pl. 159 (3).
(5)	Anvers 79.1.283; Saqqara(?)	Amenophis II(?)	De Wit, <i>Chron, d'Égypte, 36,</i> No. 68, 240 ff., fig. 21–22.
(6)	Copenhagen AEIN 663	Amenophis II or later ¹⁶	Koefoed-Petersen, op. cit., pl. 80. Vandier, op. cit., 667.
(7)	Brit. Mus. 1387	Tuthmosis IV	Edwards, op. cit., 9 f., pl. 10. Vandier, op. cit., 652.

TYPE IV (PLATE XII, 4)

In the final stage the stela became relatively larger, and stood on the ground, independently or partly merged with the knees of the statuette (Nos. 1, 7; cf. type III, No. 1). Although the hands now normally rested on top of the stela, apparently grasping it, variants showing them raised above (No. 1)¹⁷ preserved the true meaning of the pose. Perhaps to conform to the slope of the pyramid, a few stelae were inclined (Nos. 3, 4).

¹⁴ Hermann, op. cit., 41 f., 53 ff.

Cairo 42229 (temp. Osorkon III): Legrain, G., Cat. gén. du Musée du Caire, Statues vol. 3 (1914). pls. 36-7.

This statuette, which belonged to a functionary of Queen Nefertiri, mother of Amenophis I, has a coiffure of duplex type, which indicates a period not earlier than that of Amenophis II. The owner was presumably attached to the mortuary cult of the queen.

¹⁷ Cf. Brit. Mus. 480: Hall, H. R., Hieroglyphic texts from Egyptian stelae, etc., part 5 (1914), pl. 39; Budge, E.A.W., Egyptian antiquities in the possession of Lady Meux (1896), pl. 15 (the latter example now in the Wellcome Historical and Medical Museum, London).

EGYPTIAN FUNERARY STATUETTES AND THE SOLAR CULT

Most examples of type IV seem to date from the reign of Amenophis II or later. If, however, No. 1 below, thought to be probably from Theban tomb 182 (*temp*. Tuthmosis III), is correctly ascribed, there would appear to have been a chronological overlap with type III.

In the following list the development is traced down to the pre-Amarna part of Akhnaton's reign. While no examples can be cited from the later part, the continued use of the statuettes at least outside El-Amarna is shown by the incorporation of one in a larger monument, 18 the text inscribed on the stela being a traditional sun-hymn, modified apparently to accord with the Atenist doctrine. 19

	MUSEUM; PROVENANCE (WHERE KNOWN)	DATE	PUBLICATION
(1)	Fondation égyptologique, Brussels, photo. 16.067; Khôkha	Tuthmosis III(?)	Porter, B. & Moss, R. L. B., <i>Topographical Bibl.</i> , 2nd ed. (Oxford, 1960) I, 289 (tomb 182).
(2)	Metrop. Mus. of Art, New York, 17.190.1960	Amenophis II or later ²⁰	Winlock, H., in <i>J. Eg. Arch.</i> 6 (1920), 1 ff., pl. 1. Vandier, <i>op. cit.</i> , 678, pl. 160 (2).
(3)	Formerly in Mitau	Tuthmosis IV	Wreszinski, W., Zeitschr. für äg. Sprache, 67 (1931), 132 f., pls. 9–10.
(4)	Not stated; Deir el-Medina	Tuthmosis IV	Alliot, M., Bull. Inst. fr. arch. or., 32 (1932), 70 f.
(5)	Lost; Sheikh 'Abd el-Qurna	Tuthmosis IV(?)	Davies, N. de G., <i>Tomb of Nakht</i> (New York, 1917), 36 ff., pl. 28, fig. 6. Porter & Moss, op. cit., 102 (tomb 52).
(6)	Durham Univ. Or. Mus. 508, Alnwick Collection (=pl. XII, 4), ²¹ Thebes.	Amenophis III	Birch, S., Eg. Antiq. at Alnwick Castle (London, 1880), 68 f. Aldred, op. cit., pl. 57. Vandier, op. cit., 667.
(7)	Thebes NE 1; Dra' Abu el-Naga'	Amenophis III(?) (Atenist erasures)	Northampton et al., Report on some excavations in the Theban necropolis (London, 1908), 10 f., pls. 7, 17 (7). Vandier, op. cit., 680.
(8)	Florence 1722	Amenophis IV	Schiaparelli, E., Mus. arch. di Firenze, Antichitá egizie (Rome, 1887), 464 f.

After the Amarna Period the statuettes showed little further development apart from a tendency to the substitution of solar motifs (sun-disk, solar bark, etc.) for funerary ones in the arch of the stela. Very rarely, however, figures of type IV

²¹ Reproduced by courtesy of the Director, School of Oriental Studies, Durham.

Bissing, F. W. von, 'Stele des Nechtmin aus der El Amarnazeit,' Zeitschr. für äg. Sprache, 64 (1929), 113 ff. pl. 4.
 Stewart, H. M., 'Some pre- Amarnah sun-hymns'. J. Eg. Arch. 46 (1960), 85 ff.

Porter & Moss, op. cit., p. 340, suggest attribution to tomb 255, temp. Horemheb(?).

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are represented standing,²² and dyad statuettes of relatives kneeling side by side before a single stela are not unknown.²³

The increasing importance of the stela seems to have resulted in some cases in the elimination of the statuette. Several stelae bearing solar inscriptions, found on the sites of Nineteenth Dynasty private tombs at Deir el-Medîna, were thought by Bruyère²⁴ to have replaced the figurines in the pyramid-niches. But although the statuettes seem, as Vandier²⁵ observes, to have been very few after the reign of Sethi I, specimens, possibly archaistic, continued sporadically even into the Late Period.²⁶

Despite the greater inscriptional space afforded by the developments described above, the texts on the whole remained too short to contain more than a few conventional epithets of the sun-god, or part of a traditional hymn. There was little scope for enlargement on the universalist character which Amen-Re' acquired as a result of imperial expansion during the Eighteenth Dynasty, and which was to be such an important attribute of the sun-god in the Amarna hymns. With few exceptions, however, funerary texts rarely touched on this theme, and it may perhaps have been felt that eulogies of the imperial power of the state god in his solar manifestation—as expressed in one hymn:²⁷ 'adoration of Amun, when he shines as Harakhti'—were less relevant to their architectural context and to the funerary cult in general than more purely solar hymns.

Brit. Mus. 2294: Budge, Guide to the 3rd and 4th Eg. Rooms, 97; Durham Univ. Or. Mus. 507 (former Alnwick Collection): Birch, op. cit., 66 f.

Louvre A63: Vandier, op. cit., 671, pl. 160 (5): Bruyère, op. cit., 1945-7, 80, fig. 60.

²⁴ Op. cit., 1923-4, 12 ff.

²⁵ Op. cit., 472.

²⁶ Cairo 42208 (22nd Dyn.), 42229 (23rd Dyn.), 42237 (25th-26th Dyn.): Legrain, op. cit., vol. 3, pls. 15-6, 36-7, 46-7 respectively.

Brit. Mus. 829: Edwards, op. cit., 24 f., pl. 21. Varille, A. 'L'hymne au soleil des architectes d'Amenophis III, Souti et Hor', Bull. Inst. fr. arch. or. 41 (1942), 25 ff., pl. 2.

Barrow-Grave 6 at Komarów*

by Tadeusz Sulimirski

In 1934–1936, with Dr. J. Grabowski and others I excavated over sixty mounds at Komarów near Halicz, Galicia, then in south-east Poland. This cemetery extended over a distance of some $2\frac{1}{2}$ km. along the ridge of a Carpathian foothill which reached the Dniester further north. The barrow-graves dated from the late Neolithic to the Early Iron Age; the latter and those of the developed Bronze Age belonged to the 'Komarów' culture which I have named after that cemetery.

Only preliminary reports on these investigations have been published,¹ though my detailed description of the cemetery and a study of the Komarów culture was already in the hands of the publishers before the War. Unfortunately, both typescripts were destroyed by the Nazi occupants of Poland. However, most of my notes and records were preserved by Prof. dr R. Jamka, Dr. M. Trzepacz-Cabalska and others in Cracow, and by Dr. K. A. Nowotny (Vienna), to all of whom I am much indebted. Thanks to generous help from the Caluste Gulbenkian Foundation, I have been able to resume work and prepare the publication once more.

In this article, which is closely connected with that work, I intend to deal solely with barrow-grave 6 of the cemetery. It is of importance both for the study of the relations between Central and Eastern Europe during the Middle Bronze Age, and for the chronological considerations involved.

*In this article the following are the chief abbreviations used:

AAASHung Acta Archaeologica Academiae Scientiarum Hungaricae.

CPT Chronologie Préhistorique de la Tchecoslovaquie (Prague, 1956).

ESA Eurasia Septentrionalis Antiqua.

MIA Materialy i Issledovaniya po Arkheologii SSSR

PA Przegląd Archeologiczny

PPS Proceedings of the Prehistoric Society.

SA Sovetskaya Arkheologiya.

St. Cerc. Studii si Cercetari de Istorie Veche.

ZOW Z Otchlani Wieków.

Sulimirski, T. 'Cmentarzysko kurhanowe w Komarowie kolo Halicza i kultura komarowska.' Sprawozdania P.A.U., 41 (1936), Kraków, 273 ff.; idem, 'Das Hügelgräberfeld in Komarów und die Kultur von Komarów,' Bulletin International de l'Académie Polonaise, Kraków (1936), 172 ff.; idem, 'Kurhany komarowskie.' Zloty Szlak, Stanisławów, 4 (1939) 2 ff. A full report on these excavations will appear in my work Corded Ware and Globular Amphorae North East of the Carpathians (Athlone Press, London).

Barrow-grave 6 at Komarów has been mentioned several times in archaeological literature. The pin found in it was dealt with by I. Nestor;² its three metal objects were published by L. Kozłowski,³ but no proper description of this burial and its grave-goods has yet been published.

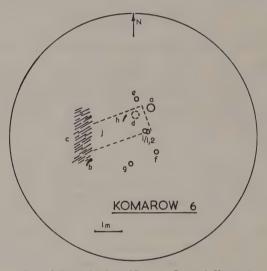


Fig. 1. Schematic plan of Barrow-Grave 6, Komarów.

The barrow was situated in the central part of the cemetery. It was 19 m. in diameter, about 70 cms. high (Fig. 1). The burial was uncovered under the centre of the mound; this was a shallow pit (marked 'j' on the sketch-plan) c. 2 m. long, 1 m. wide, about 25 cms. deep (from the ancient surface), orientated approximately NE-SW. Only slight traces of the skeleton were recognisable, mainly of the skull ('d'), which was near the north-eastern corner of the pit. A very badly preserved bronze pin ('h'; Fig. 2) lay on the site of the chest. Two vessels, a cup ('i/1'; Fig. 2) and a bowl ('i/2') stood in the south-eastern corner of the grave, and near its north-eastern corner, on the ancient surface, two other vessels were found, a pot ('a') and a beaker ('e'; Fig. 2). Across the western end of the pit was a layer of timber logs ('c'), about 2 m. long, 50 cms. wide; at its southern end lay a small bronze dagger in a wooden sheath ('b'; Fig. 2).

² Nestor, I., 'Depôt (?) de bronzes de Medgidia (Dobrogea), 'Dacia 5-6 (1938), 187 f.

Kozlowski, L., Zarys pradziejów Polski południowo-wschodniej (Lwów, 1939), pl. XIII, 18-20.

At a distance of nearly 1 m. south of the eastern corner of the pit, on the ancient surface, stood a completely crushed vessel ('f'), and some 60 cms. WSW of it, on the same level, lay a gold ear-ring ('g'; Fig. 2). This was presumably the site of another burial laid parallel to the main one (in the pit), the skeleton of which had decayed completely and disappeared; both burials were apparently deposited at the same time.

All five vessels were made of a clay paste tempered with grains of crushed quartz and ground fired clay, their surface being covered with a slip and smoothed. They are typical of the Komarów pottery in which Trans-Carpathian and northern (Trzciniec culture) influence is reflected. To the latter belonged the tulip-shaped pot ('a'), 29 cms. high, 20 cms. in diameter, yellowish-grey in colour, undecorated. Of the same type was pot 'f', reconstruction of which was not practicable.

The tulip-shaped pots were very characteristic of the Komarów culture, but they never appeared in barrow-graves of the Sub-Carpathian area during the preceding period (late Neolithic and Early Bronze Age). They probably evolved out of the Corded Ware beakers somewhere in Central Poland, and were the most typical vessel of the Trzciniec culture of the early Middle Bronze Age⁴; they were found in the graves of the eastern groups of the Lusatian culture⁵ and later were characteristic of the Wysocko culture⁶. Their appearance in the pottery of the Komarów culture was probably due to the influence exercised by the Trzciniec culture.

Closely related to the above pots, but smaller in size, was the beaker ('e'; Fig. 2), 12.5 cms. high, 12.5 cms. in diameter, brownish in colour. Its neck was decorated by a horizontal band consisting of four parallel grooves with one row of small punctures above and another below, on a raised band. Below the raised band were evenly distributed groups, each of five alternating incisions.

Another characteristic vessel was the bowl, unfortunately crushed so that its reconstruction was not practicable. Its body was covered with slanting fluting. This was a well-established type of the Komarów culture⁷; such a vessel from barrowgrave III at Bukówna was accompanied by a bronze pin and spiral arm-band with spiral terminals⁸ typical of the Middle Bronze Age Koszider group of hoards⁹.

Nosek, loc. cit., footnote 4, pl. XLI, XLIV.

Sulimirski, T., Kultura wysocka (Kraków, 1931), pl. IX, XI, XII.

Nosek, S., 'Zagadnienie Prasłowiańszczyzny w świetle prehistorii,' Światowit, 19 (1948), pl. XXIII-XXV: Gardawski, A. 'Plemiona kultury trzcinieckiej w Polsce,' Materialy Starożytne, 5 (1959), pl. XV, XXXVIII, XLII, I.X.

Rogozińska, R., 'Cmentarzysko kultury komarowskiej w Bukównie,' Materialy Archeologiczne, 1 (1959), pl. III, VII.

Siwkówna, I., 'Tymczasowe wyniki badań terenowych w Bukównej, pow. tlumacki,' ZOW 13 (1938), 67 ff., fig. 1-3.

Mozsolics, A., 'Archäologische Beiträge zur Geschichte der grossen Wanderung,' AAASHung 9 (1959), 122 ff.; Bóna, I., 'Chronologie der Hort-Funde von Koszider-Typus,' AAASHung 9 (1959), 211 ff., fig. 5.

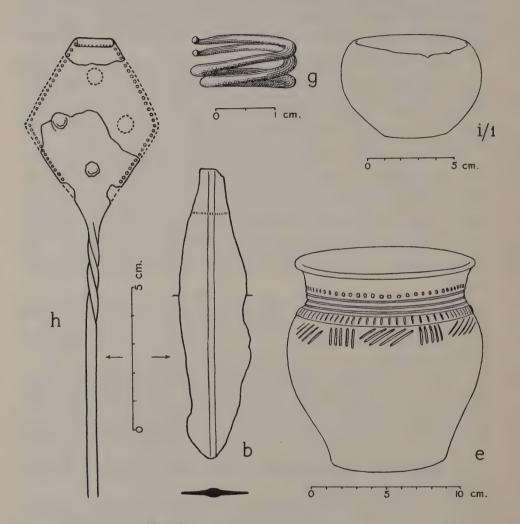


Fig. 2. Objects from Barrow-Grave 6, Komarów. (The lettering follows that on the site-plan, Fig. 1).

Similar vessels appear in the southern groups of the Trzciniec culture¹⁰, south of the Carpathians in the Otomani culture¹¹; the slanting fluted decoration is also met on the Middle Bronze Age pottery there¹².

The fifth vessel ('i/1') was a low, wide, hemispheric cup. 4.7 cms, high, 7.8 cms. in diameter, yellowish-grey in colour, undecorated (Fig. 2). Cups of this

type were often found in Komarów pottery.

Of greater interest were the three metal objects found in our mound. The least typical was the gold ear-ring ('g') made of a thin double wire wound in 1½ spiral (Fig. 2). This was a common type in Central Europe during the Early and Middle Bronze Age; it is not of importance for dating purposes.

The bronze pin ('h') was 22 cms. long, made of wire round in section, about 3½ mms. thick, its upper part twisted. Its head was flat, rhomboid in shape, 7 by 4.5 cms. in size, its top rolled up (Fig. 2). It had a row of small punctures along its

edges and four larger bosses pressed from below near its four corners.

Pins of the same type, but a little larger, were found in two other, very distant sites. One of these was excavated in a barrow-grave at Gulay-Gorod, between Cherkasi and Smyela in the Ukraine, along with another very similar bronze pin which had all the corners of its flat head rounded13; the grave-goods associated with these pins were not important for dating purposes. Another pin with a rhomboid head was found at Medgidia in Dobrudia¹⁴. It was associated with a bracelet made of a bronze bar oval in section, thinning out towards its terminals, and with a bronze knife, or sickle. The bracelet was of a type which appears in the Early and Middle Bronze Age assemblages of Central Europe; but the 'sickle' cannot be dated earlier than the Middle Bronze Age (B1 or B2).

Finally, a pin of the same type formed part of the hoard from Borodino in South-Bessarabia¹⁵. However, it differed in some details from those mentioned above: it was made of silver and was provided with a small, vertically-perforated knob on the top of its rhomboid head instead of a rolled-up loop. Its decoration also differed and consisted of gold-incised spiral motifs which, as commonly agreed, show close relation to the Mycenean decorative style. They are considered

Popescu, D., Die frühe und mittlere Bronzezeit in Siebenbürgen (Bucaresti, 1944), 89 ff.

Originally published by Bobrinskoi, A., Kurgany i slučainyia arkheologičeskia nakhodki bliz miestečka Smiely, I

(St. Petersburg, 1887) 102, pl. IX, 7, 8 (barrow-grave 41).

Nestor, loc. cit., footnote 2.

Gardawski, A., loc. cit., footnote 4, pl. XVIII, XXVI, XXXV.

Eg. Horedt, K., 'Santierul arheologic Morești,' St. Cerc. 6 (1955), 659, fig. 16: 4. See also: Milojĉić, V., 'Zur Frage, der Chronologie der frühen und mittleren Bronzezeit in Ostungarn.' Congrès Internat. des Sciences Prèhistoriques et Protohistoriques, Zürich (1950), 260 ff.

The hoard has been published and discussed by many authors, see: Tallgren, A. M., 'La Pontide préscythique après l'introduction des métaux,' ESA, 2 (1926), 129 ff.; Krivtsova-Grakova, O. A., 'Stepnoe Povolzhe i Pricernomorie v epokhu pozdnei bronzy' MIA, 46 (1955); Gimbutas, M., 'Borodino, Seima and their Contemporaries,' PPS 22 (1956), 144 ff.

to be a simplified version of the motifs which occur on Mycenean buttons, and to represent vestiges of the Mycenean shaft-grave tradition.

There is no common agreement as to the date of the hoard of Borodino¹⁶. An approximate date about 1400–1100 B.C. has been proposed by A. M. Tallgren; O. A. Krivtsova-Grakova dates it to the 14th century, and remarks that it could not be later than 1200 B.C.; M. Gimbutas places it about 1450–1350 B.C., and R. Hachmann¹⁷ considers it to date from the Shaft-grave period (i.e. before 1500 B.C.)

The pins with rhomboid head evidently evolved out of the flat head pins (Scheibennadel) of the Unetice culture, as has been rightly observed by I. Nestor¹⁸. Such pins were found in the early graves of the cemetery of Vel'ký Grob in Slovakia¹⁹ dating from period A1 of the Bronze Age, but appear also in graves of period A2. Our pins with rhomboid head were of a later date, and the second specimen from Gulay-Gorod, with rounded corners, seems to represent the earliest stage in their evolution. It is of interest that pins highly similar to those of our type were found in Scandinavian assemblages of period I of the Bronze Age (Montelius)²⁰; they also derived ultimately from the Unetician prototype. I. Nestor considers the pin from Komarów to be the earliest of our series, and that from Borodino the latest. The pin from Medgidia must also have been of a later date than the two other bronze pins, as is suggested by its associated bronzes.

I. Nestor seeks the origin of these pins somewhere in Dobrudja, or in the south of the Ukraine, which seems improbable. The very close similarity of all three bronze pins suggests that they must have originated from the same centre, but the sites in which they were found lie very distant from each other. They form three corners of a large, nearly equilateral triangle (map, Fig. 4), the distance from Medgidia to Gulay-Gorod being about 620 km. as the crow flies, and to Komarów about 600 km.; the distance from Komarów to Gulay-Gorod is about 530 km. No more pins of this type have been found within the range of this enormous triangle, except for the silver pin from Borodino which lies c. 160 km. north of Medgidia, in the southern corner of the triangle. This geographical distribution, and also the late date of the two southern pins, are in favour of a more northern centre for their origin.

See footnote above. In my article: 'The Cimmerian Problem,' Bulletin of the Institute of Archaeology, 2 (1959), fig. 1, I have placed it erroneously to about the end of the 13th century B.C., some 100 years too late.

Hachmann, R., Die frühe Bronzezeit im westlichen Ostseegebiet und ihre mittel—und südosteuropäische Beziehungen (Hamburg, 1957), 170 ff.

Nestor, loc. cit., footnote 2.

¹⁹ Chropovský, B., 'Gräberfeld aus der älteren Bronzeit in Vel'ký Grob,' Archaeologia Slovaca-Fontes, 3 (1960), 70.

Forssander, J. E., Der ostskandinavische Norden während der ältesten Metallzeit Europas (Lund, 1936), 244, pl. LIX.

The third metal object from our barrow-grave was the bronze dagger ('b'), about 10 cms. long, originally over 2.5 cms. wide, lenticular in section with a slightly marked middle rib (Fig. 2). It was of a type unknown in Central Europe but typical of the early Srubna culture on the Volga²¹, and also of the Seima culture further north, both of which O. A. Krivtsova-Grakova dated to the 15–13th centuries B.C., and the same date was estimated by M. Gimbutas²². Daggers of the same type were also found in the Northern Caucasus where they were called 'steppe type' by E. I. Krupnov²³, who put them to the end of the second millennium B.C. Those from the north-western Caucasus belonged to the late Kuban period and were placed by A. A. Yessen²⁴ as after 1200 B.C. Several specimens of the same type were also found on the Dnieper, where they were associated with remains of the Srubna culture; O. A. Krivtsova-Grakova²⁵ remarks that the Srubna culture did not advance into the region on the Dnieper until the end of the second millennium B.C.

A short review of the grave-goods from barrow-grave 6 at Komarów reveals that they include Central and East European elements. They reflect connections with the Trzciniec culture of Central Poland dating from period II of the Bronze Age (Montelius); with the cultures of the countries south of the Carpathians dating from the final stage of the Early Bronze Age (Reinecke's A2) and the beginning of the Middle Bronze Age (Period B), or from periods B II and B III of the Hungarian chronology according to A. Mozsolics²⁶; finally, with the early Srubna and Seima cultures of East Europe. The grave was approximately coeval with the hoard from Borodino, in which relations with the early Srubna and Seima cultures were also reflected. All these connections are not only of importance for establishing the date of the grave and of the Komarów culture in general, but are likewise very valuable for cross-dating the various cultures and finds involved.

The absolute chronology of the Central European Early Bronze Age is disputable. It is ultimately based on the chronology of a series of remains which reflect connections with the Mycenean culture. Recently a marked tendency has become apparent to place the date of the leading finds as high as possible; only the Shaft-grave period has been taken into consideration in this connection by several authors, and the Central European chronology adjusted accordingly. This

²² Loc. cit., footnote 16, 165 ff.

²³ 'Materialy po arkheologii Severnoi Osetii dokobanskogo perioda', MIA, 23 (1951), 62 f., fig. 23.

²⁵ *Loc. cit.*, footnote 21, 110 ff.

²¹ Tallgren, loc. cit., footnote 15, fig. 46: 7, 8; Krivtsova-Grakova, O. A., loc. cit., footnote 15, 54 ff., fig. 12.

Materiary po arkneologii severnoi osetii dokobanskogo perioda, MIA, 23 (1931), 02 1., ng. 23.
 Prikubanskii očag metallurgii i metalloobrabotki v kontse mednobronzovogo veka', MIA 23 (1951), 87 f., fig. 14.

²⁶ Mozsolics, *loc. cit.*, footnote 9, 119 ff.

has been well exhibited by the attribution of important finds within that area, e.g. the group of Transylvanian bronze hoards of Apa type, to different periods and by dating them differently.27

The 'Mycenean' remains in Central Europe appear within a very wide territory extending from Moravia in the west to the Black Sea north of the Danube in the east (Map, Fig. 3). They consist mainly of discs, horse mouth-pieces and trappings and other ornaments made of bone or antler with carved spiral or circular decoration in the Mycenean style. They were found in settlements of the Věteřov culture in Moravia,28 of the Mad'arovce culture in Slovakia,29 of the Füzesabony culture in Hungary,30 at Vattina in north-east Yugoslavia,31 at Sărăta-Monteoru in Moldavia³², etc. Here also belong marble discs from Donia Dolina and Surčin in Yugoslavia³³, gold discoid plaques from the hoards of Velem-Szentvid and Cófalva, similar bronze specimens from Gyula, Sacheidid, etc.34, gold plaques from the hoard found at Ostrovul Mare in Roumania35 and the gold ornament from Poiana³⁶. Striking 'Mycenean' features (shaft-grave III) are exhibited by the ornament of the gold bracelet from Bellye-Bilja³⁷ in Yugoslavia. P. Reinecke³⁸ points to the 'Mycenean' type of the large, doublehandled vase from the gold hoard of Vlcitrön (Vultchi-Trn) in Bulgaria and remarks that the ornament of the gold lid from this hoard calls to mind the decoration of the silver pin from Borodino which, as mentioned previously, was decorated likewise in the 'Mycenean' style. Swords from the bronze hoard of Apa in Transylvania and the silver spear-head from Borodino were also adorned in the 'Mycenean' style39.

Finally, a number of Mycenean bronze swords should be cited. They were

²⁸ Tihelka, loc. cit., as above.

Tihelka, as above. Decorated horse trappings from Malé Kosihy and Nitrianský Hrádok have been kindly shown me by Dr. A. Točik, Nitra.

Milleker, B., A Vattinai östelep. (Temesvár, 1905), pl. VIII, IX: and many subsequent publications. Mentioned by Piggott, loc. cit., footnote 30, 290.

Mozsolics, loc cit., footnote 30 (Surčin), and in the Zemalski Muzej, Sarajevo (Donja Dolina).

Popescu, D. and V., 'Asupra Tezaurului de aur de la Ostrovul Mare', St. Cert., 6 (1955), 865 ff.

Nestor, loc. cit., footnote 34, 98 ff.

See footnote 15 and 27.

e.g.: Popescu, D., 'Dépôt des bronzes de Apa', Dacia, 7-8 (1941), 119 ff.; Milojeic, loc. cit., footnote 12, 275; Hachmann, loc. cit., footnote 17, 91 ff.; Tihelka, K., 'K datování konce únětické kultury', Casopis Moravského Musea, 40 (1955), 33 ff.; idem, 'On the Relation Between the Věteřov type and the Unetice culture in Moravia', CPT, 86 ff.; idem. 'Moravský věteřovský typ', Památky archeologické, 51 (1960), 121 ff.

Mozsolics, A., 'A Cofalvi (Tufalau) aranylelet', Antiquitas Hungarica, 3 (1949), 14 ff. mentioned by Hachmann, loc. cit., footnote 17, 175, and by Piggott, S., 'Neolithic and Bronze Age in East Europe', Antiquity, 34 (1960),

Mozsolics, as above; Nestor, I., 'Der Stand der Vorgeschichtsforschung in Rumänien', 22 Bericht d. röm.-germ. Kommission (1932), 120.

Mozsolics, A., 'Le bracelet d'or de Bellye', AAASHung I (1951), 81 ff. 'Ein neuer Goldfund aus Bulgarien', Germania 9 (1925), 50 ff.

found in Roumania, with one in Slovakia⁴⁰: according to N. K. Sandars⁴¹, they all belong to the Aegean type A which was current in the Aegean territory chiefly during periods LM I and LH II. The bronze helmet from Beitsch-Bjecz in Poland⁴², and perhaps those from Lucky in Slovakia and Oranienburg in East Germany, should be mentioned in this context, as should be the clay replicas of quatrefoil-mouthed kantharoi from Pecica and Szöreg; the latter, as pointed out by V. G. Childe⁴³, may be connected either with the alabaster kantharos from Mycenean shaft-grave VI, or with similar vessels from Anatolia where they were popular c. 1400–1200 B.C.

Only a few of the above objects were actually imported from the Mycenean territory in the Aegean, or from Asia Minor, the rôle of which in the diffusion of Mycenean style in Central Europe has been vindicated by A. Mozsolics⁴⁴. For the most part they were made locally in a few centres situated somewhere in the Hungarian Plain and Transylvania, which worked under a strong Mycenean, or Anatolian, influence, perhaps even on behalf of Mycenean or Trojan merchants and under their supervision. The geographical distribution of the 'Mycenean' finds along the Danubian waterway system (Fig. 3) suggests the Danube-Black Sea thoroughfare for the southern connections, in which Troy (the VIth city) must have held a most important position.

The 'Mycenean' decorative style of Central Europe was closely related, though not identical, with the genuine Mycenean shaft-grave style; as remarked by M. Gimbutas⁴⁵, it represents a lingering of the Mycenean shaft-grave tradition. S. Piggott⁴⁶ emphasizes that 'the objects decorated in this style need not represent a sharply defined "Shaft-Grave Horizon" dated to c. 1500 B.C. since the motifs involved, while appearing for the first time in this phase of Greek prehistory, certainly had a long persistence in Late Helladic times,' F. Matz⁴⁷ points to the very long persistence of the Minovan-Mycenean ornament. The very large territory within which the 'Mycenean' objects have been found in Central Europe and the considerable extent of Mycenean, or Anatolian, influence also imply a long duration of the Aegean connections.

It does not seem likely that less than 50 years, as suggested by the assumed high date of 'Mycenean' objects, would suffice for such a great and lasting impact

⁴⁰ Dumitrescu, V., 'Rapière en bronze de type mycénien, trouvée au sud-ouest de Bucarest', Dacia, 5-6 (1938),

⁴¹ 'The First Aegean Swords and Their Ancentry', American Journ. Arch., 65 (1961), 27.

Hencken, H., 'Beitzsch and Knossos', PPS, 18 (1952), 36 ff.
 'Notes on the Chronology of the Hungarian Bronze Age', AAASHung 7 (1956), 294 ff.

^{44 &#}x27;Die Herkunftsfrage de ältesten Hirschgeweihtrensen', AAA SHung 12 (1960), 133 ff.

⁴⁵ Loc. cit., footnote 15, 144.

⁴⁶ Loc. cit., footnote 30, 288.

⁴⁷ Quoted by Pleinerová, I., 'Zur Datierung der jüngeren Aunjetitzer Kultur', CPT 83.

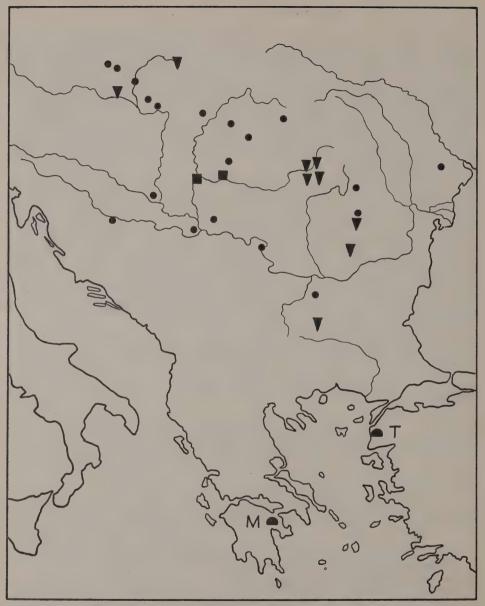


Fig. 3. Map showing the distribution of 'Mycenean' finds in the Danube basin.

T=Troy; M=Mycenae

▼ Swords and helmet

■ Kantharoi

Decorative patterns and various objects

of the Mycenean civilisation on the indigenous cultures of the Middle Danubian basin, for the establishment of local workshops in which objects decorated in the 'Mycenean' style were made, or above all, for the development and adoption of the local 'Mycenean' style. The very fine and characteristic decorative style of the 'Hungarian' bronze industry had evidently evolved from Mycenean principles. which also points to a considerably longer period for Mycenean (Anatolian) influence to take root.

The four-spoked clay model wheels, moreover, point to the same conclusion. I. Bóna⁴⁸ quotes 20 sites in various parts of the Hungarian Plain in which they were found, including those from the settlements of the Věteřov and Mad'arovce cultures in Moravia and Slovakia; and considers them to date from c. 1400 B.C. They were obviously connected with the introduction in Central Europe of chariots, as were the cheek-pieces, harness, etc.; the latter greatly enhanced the driver's control over his steeds, a matter of paramount importance in the case of war-chariots⁴⁹. Clay models of four-spoked wheels could have been made only after the chariot had been long established in the country.

The geographical diffusion of wheel models⁵⁰ closely resembles that of the 'Mycenean' ornaments (Map: Fig. 3) and in particular of horse-trappings, many of which were undecorated.⁵¹ They all give full support to I. Bóna's opinion that the spread of war-chariots was due to south-eastern, chiefly Anatolian influence. The chariot was not known in the Ukrainian steppe country, but spoked wheel models were found in Troy VI (leaden) and at Alisar Hüyük (dating from the second half of the second millennium B.C.)

Connections between the southern part of Central Europe and Mycenae or Anatolia began undoubtedly during the LH I period, or even earlier. They followed an ancient track established already in periods MH II and III: J. L. Myres, M. Hoernes and V. G. Childe 51a drew attention to remarkable parallels to the decorative style of the Mostičarska culture (Laibacher Moor), Vučedol and Mondsee, 51b which occur in the Middle Bronze Age pottery of Cyprus. This noticeable coincidence applies equally to the decorative patterns of the Tripolyan pottery of period C1 in West Podolia and Moldavia. 516 It seems that these early

Clark, J. G. D., 'Horses and Battle-Axes', Antiquity, 15 (1941), 59.

Bóna, loc. cit., footnote 48, map: fig. 7. Mozsolics, loc. cit., footnote 44, 125 ff.

^{51c} Passek, T. S., 'Periodizatsia tripolskikh poselenii', MIA, 10 (1949), fig. 62; Makarevic, M. L., Kratkie Soobshchenia Instituta Arkheologii Kiev 10 (1960), 23 ff., fig. 2.

^{&#}x27;Clay Models of Bronze Age Wagons and Wheels in the Middle Danube Basin', AAASHung 12 (1960), 104 ff. See also: Tihelka, K., 'The Question of Datation of the Four Spoked Clay Wheel Models of the Mad'arovce and Větěrov Settlements', Archeologické Rozhledy, 13 (1961), 580 ff.

Sla Childe, V. G., 'The Danube in Prehistory', (Oxford, 1929), 212.
 Dimitrijević, S., Opuscula Archaeologica I (1956), pl. I-XIV; Franz L. and Weninger J., Die Funde aus den prähistorischen Pfahlbauten im Mondsee (Wien, 1927), pl. XXVI, 7-9.

relations embraced the whole territory within which traces have been noted of Mycenean influence. To the initial period of the Mycenean connections different types of finds can be attributed, the faience beads in particular⁵² which, according to Slovakian stratigraphic evidence⁵³ belonged to the very end of Bronze Age period A1, whereas the 'Mycenean' ornaments appeared in the layers considered to be of period A2–B1, (more probably of the latter); in Hungary they undoubtedly belonged to period B III.⁵⁴ The 'Mycenean' finds of Central Europe equated evidently with periods LH II and partly LH III, during which connections with the south continued. The evidence offered by the hoard from Borodino does not favour an early date for the Apa group of hoards and for other similar remains; the grave-goods from Komarów 6, which correspond with those of the Füzesabony culture of East Hungary and of the Ottomani culture of Transylvania, confirm the late date of the finds above by cross-dating the 'Hungarian' Middle Bronze Age on eastern evidence.

The hoard of Borodino seems to mark the end of southern connections. It included a few earlier objects but placing it at c. 1500 B.C., or even earlier, ⁵⁵ is certainly wrong. Its date, based on eastern evidence produced by both O. A. Krivtsova-Grakova and M. Gimbustas, ⁵⁶ is c. 1300 B.C., although the latter author proposes a somewhat higher date. Barrow-grave 6 of Komarów was of a little earlier date (the pin); its connections with the early Srubna culture (the dagger), shown likewise by the Borodino hoard, suggest the 14th century B.C.

The hoard from Borodino was not the private property of a merchant founder, etc.: it was clearly a princely treasure. In spite of the few eastern analogies, it was obviously of local, East-Central European origin. It was probably hidden and never recovered by a local ruler who had been deprived of his principality by the advancing Srubna tribes. Approximately at that time the Catacomb culture in the steppe east of the Dnieper ceased to exist; according to O. A. Krivtsova-Grakova and other Soviet authors, ⁵⁷ the Srubna culture reached and crossed the Dnieper in the 13th century B.C., a time conspicuously close to the date of the Borodino hoard. At about the same date all external connections of the Sărăta-Monteoru culture in Rumania were interrupted, ⁵⁸ and this was a period of unrest in the Hungarian Plain, too, during which many large settlements were

Stone, J. F. S., and Thomas, L. C., 'The Use and Distribution of Faience in the Ancient East and Prehistoric Europe', PPS 22 (1956), 54, map, fig. 3; Clark, J. G. D., 'Prehistoric Europe', (London, 1952), 266 ff., fig. 145 (map).

At Malé Kosihy—according to the information kindly given by Dr. a Točik.

Mozsolics, loc. cit. footnote 9, 139.

⁵⁵ Hachmann, loc. cit., footnote 17, 172.

See footnote 15.

The relative literature has been quoted in my article: see footnote 16, 55 ff.

Piggott, loc. cit., footnote 30, 290.

abandoned or destroyed, as emphasized by A. Mozsolics. 59 The end of the Veterov culture in Moravia has been similarly dated. 60

Study of the diffusion of the 'Hungarian' bronzes in the Ukraine is likewise instructive in this respect. Bronzes of the 'Koszider' type were found north-east of the Carpathians up to the Dnieper, and even beyond that river (Map, Fig. 4); some of these, hitherto unpublished, have been reproduced here (Fig. 5, 1-14).

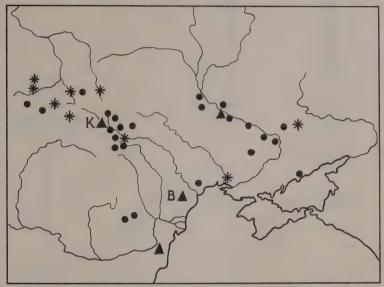


Fig. 4. Map showing the distribution north-east of the Carpathians of

- Bronze hoards 1
- 'Hungarian'
- Stray objects }
- Middle Bronze Age type
- Pins of Borodino type B = Borodino: K = Komarów

They were characteristic of the Hungarian Middle Bronze Age and were partly coeval with the barrow-grave 6 of Komarów; this is well illustrated by grave-goods from the tumulus at Nyirkarasz-Gyulaháza. 61 However, no later 'Hungarian' bronzes were found in the east, except for the area close to the Carpathians and in West Podolia. 62 They did not reappear in the Ukrainian grassland until the end of

Mozsolics, *loc. cit.*, footnote 9, 140 ff.
 Spurny, V., 'Zur Chronologie der mittleren Bronzezeit in Mähren', CPT, 104 f.; Piggott, as above, 287.

Mozsolics, A., 'Der Tumulus von Nyirkarász-Gyulaháza', AAASHung 12 (1960), 113 ff.; see also: idem. loc. cit., footnote 10, 131 ff.

Zurowski, K., 'Zabytki brązowe z młodszej epoki brązu i wczesnego okresu żelaza z dorzecza górnego Dniestru', Przegląd Archeologiczny, 8 (1949), 155 ff.



Fig. 5. Bronze battle-axes, spear-heads and sickles of the Hungarian Middle Bronze Age found north-east of the Carpathians. $(\frac{1}{3})$

1. Battle-axe. Ukraine. Before the war at the Sevčenko Museum, Lwów. Now missing. 2. Battle-axe. Strachocina, Poland. Museum at Sanok. 3. Battle-axe. Prelipcze, Bucovina. Archaeological Museum Cracow. 4. Battle-axe. Province of Dnepropetrovsk. Before the War in the Museum at Dnepropetrovsk. 5. Battle-axe. Zablotów near Sniatyn. Before the War at the Lubomirski Museum in Lwów. Probably missing. 6. Spear-head. Ukraine. Before the War at the Army Museum in Warsaw (No. 32566). Missing. 7. Spear-head. Petrovka near Poltava. Before the War at the Museum in Poltava. 8. Spear-head. Ukraine. Before the War at the Sevčenko Museum in Lwów. Missing. 9. Spear-head. Ukraine. Before the War at the Sevčenko Museum in Lwów. Missing. 9. Spear-head. Ukraine. Before the War at the Sevčenko Museum in Lwów. No. 32585). Missing. 10. Sickle. Ukraine. Before the War at the Museum in Dnepropetrovsk. 12. Sickle. Ukraine. Before the War at the Czartoryski Museum in Cracow. 13, 14. Sickles. Ukraine. Before the War at the Sevčenko Museum in Lwów (Nos 2524 and 2522). Missing.

the Late Bronze Age and the Early Iron Age; ⁶³ instead eastern, Uralian types, and later likewise Caucasian (Koban) or Transcaucasian were typical of that region. ⁶⁴

The movement of the Srubna tribes was not an isolated event confined to the Ukraine. It must have been connected with, and evidently caused by, large-scale movements of steppe peoples, the pressure of whom on Western Asia is evidenced by a series of representations of fantastic centaur-archers in Babylonia. Their date, the 14–13th century B.C., tallies well with that of the Srubna advance, and at the same time confirms the date of the Borodino hoard.

A very significant development in the Aegean seems to have been likewise connected with the events above. By the end of the 14th century B.C., Mycenean pottery appeared in the settlements in Rhodes and other eastern Aegean islands, regions in which it was not diffused in earlier periods. We may conjecture that Mycenean trade, having lost access to the northern provinces, now had to expand in another direction to find an outlet. In any case, this development coincides with the severance of Mycenean connections with Central Europe evidenced by the absence of late Mycenean objects there. It is worth mentioning that only early types of Mycenean swords were found in the north, but no later ones, ere except the southern-most specimen from Karaglari in Bulgaria found with a bronze spearhead of Mycenean type.

In conclusion we may repeat that the 'Mycenean' objects in Central Europe cannot be treated as forming a sharply defined chronological horizon. Their number, their wide geographical diffusion (Map, Fig. 3), the deviation of their style from the genuine Mycenean style, etc., imply that they were products of local workshops. They formed part of a wide, long-lived 'Mycenean Kulturkreis' in that part of Europe, the beginning of which cannot be dated earlier than the end of the 16th century. The hoard from Borodino, which embraced objects decorated in the 'Mycenean' style, marks its end, c. 1300 B.C., caused by the pressure of eastern peoples. All chronological considerations based on 'Mycenean' connections must take the circumstance into account that all the 'Mycenean' objects found in that part of Europe dated from a period c. 1525–1300 B.C., about 200 years long.

⁶³ Tallgren, loc. cit., footnote 15, 152 ff.

Terenozhkin, A. I., 'Srednee Podneprovie v načale zheleznogo veka', SA 2 (1957), 47 ff.

⁶⁵ Sulimirski, T., 'Les archers à cheval, cavalerie légère des anciens', Revue Internationale d'Histoire Militaire, 3 (1952), 447 ff., fig. 1.

Stubbings, F. H., 'Mycenean Pottery from the Levant' (Cambridge, 1951); Mylonas, G. E., Ancient Mycenae (London, 1957), 14.

Sandars, N. K., loc. cit., footnote 41, 28.

⁶⁸ Casson, S., 'Mycenean Elements in the North Aegean', Man, 23 (1923), No. 107, fig. 3.

LIST I. 'MYCENEAN' FINDS IN THE BASIN OF THE MIDDLE DANUBE. (Map, Fig. 3)

Mycenean Swords—(see footnote 40, 41, 68)

Alma Meghierus Alumis Poiana

Dumbravioara Rosiori-de-Vede
Inlaceni Sy, Jur (Pozsonyszentgyörgy)

Karaglari

Helmet (see footnote 42)

Lučky

Kantharoi (see footnote 43)

Pecica Szöreg

Decorative patterns (gold, bronze, marble and bone discs, antler horse trappings, bronze swords, pins, etc.: see footnote 28-36, 39).

Apa Ostrovul Mare
Borodino Poiana
Cezavy-Blučina Sepse
Cofalva-Tufalau Surčin
Donja Dolina Vattina
Füszesabony Vesele
Hajdusamson Věteřov

Nitransky Hrádok

Other gold objects (see footnotes 37, 38)

Bilja-Bellye Vultchi-trn

LIST II. BRONZES OF KOSZIDER TYPE NORTH-EAST OF THE CARPATHIANS (Map. Fig. 4)

Hoards

Kamionka Strumilowa. Kozłowski, L. Wczesna, starsza i środkowa epoka brązu w Polsce (Lwów 1928), 54, pl. XIII: 19, 20.

Nikolaev Tallgren, A.M., ESA 2 (1925) 152, fig. 80.

Novopavlovka near Kharkov (Tallgren, as above, 146 f., fig. 81).

Prelipcze, Bucovina Kostrzewski, J., PA 2 (1923), 217, fig. 9, wrongly published as from Babin; Nestor, I., see footnote 34, 128 f., pl. 12: 7; Tallgren, as above, fig. 100; Sulimirski, T., Revista de Preistorie si Antichitdti Nationale I (Bukarest, 1937), 5. Fig. 5, 3.

Radymno near Przemyśl. Kozłowski, as above, pl. XIII: 22-25; Sulimirski, T., Bronzy Malopolski Środkowej (Lwów, 1929), 12 ff., pl. I: 6-9.

Stawiszyce district of Pińczów. Dabrowski, J. and Okuliczowa, L., Wiadomości Archeologiczne 28 (1962), 243 ff., figs. 1, 2; pl. LI, LII.

Stefkowa near Lesko. Kostrzewski, J., Praehistorische Zft 10 (1918), 160 ff., figs. 1-9; Sulimirski, as above, 7 ff. pl. I: 2-5.

Włostowice district of Pińczów Kozłowski, as above, 129.

Zalęże near Jasło Krauss, A., Wiadomości Archeologiczne 23 (1956), 72 ff., figs. 2-4; pl. XI, XII.

Stray battle-axes

Dnepropetrovsk province (formerly Ekaterinoslav) Tallgren, A. M., ESA 2 (1925), 173; before the War at the Museum Dnepropetrovsk).

Drajna-de-Jos, Roumania Nestor, I., see footnote 34, 128, pl. 16: 7, 8, 19.

Kiev, environments and province, 5 specimens Tallgren, A. M., ESA 11 (1937), 8, fig. 12.

Moldavia, 2 specimens Tallgren, A. M., ESA 2 (1925), 173, footnote 5.

Nehoi near Buzau, Roumania Nestor, as above, 128.

Orlovo near Melitopol Tallgren, as above, 8, fig. 11.

Podolia Antoniewicz, W., Archeologia Polski (Warszawa, 1928), pl. 14: 15.

Stary Sacz, Poland Kostrzewski, J., PA 2 (1923) 215.

Strachocina near Sanok (Museum at Sanok).

Fig. 5, 2.

Ukraine (before the War in the Sevčenko Museum, Lwów).

Fig. 5, 1.

Zablotów near Śniatyn. Kozłowski, L., Wczesna, starsza i środkowa epoka brązu w Polsce (Lwów, 1928), 54, pl. XIII: 18.
Fig. 5, 5.

Stray swords

Burkanów near Podhajce Kostrzewski, J., PA 2 (1923), 217.

Middle Dnieper region. Tallgren, A. M., ESA 2 (1925), 203.

Wysowa near Gorlice, Poland. Kozłowski, as above, 136.

Zawadyńce near Kamenets Podolskii. Tallgren, as above, 202, fig. 112: 1.

Daggers (from barrow-graves)

Sukleia near Odessa, Tallgren, A. M., ESA 2 (1925), fig. 112: 3; idem, ESA 11 (1937), fig. 4: 3; Passek, T. S. Periodizatsiya tripolskikh poselenii, MIA 10 (1949), fig. 99: 11.

Tsareva Mogila near Krivoi Rog. Tallgren, A. M., ESA 2 (1925), 114, fig. 4: 3.

Stray spear-heads

Banila (Banilów), Bucovina. Sulimirski, T., Revista de Preistorie si Antichităti Nationale I (Bukarest, 1937), 4. fig. 7.

Cherkasi (before the War in the Chojnowski Collection, Army Museum Warsaw, No. 565).

Kiev province. Terenozhkin, A. I., SA 1957-2, 58, fig. 6: 19; idem, Peredskifskii period na dneprovskom Pravoberezhie (Kiev, 1961), 143, fig. 95: 8.

Komarów near Halicz Kozlowski, L., Wczesna, starsza i środkowa epoka brązu w Polsce (Lwów, 1928), 104

Krechów near Zolkiew, Kozlowski, as above, 104.

Petrovka near Poltava (before the War in the Museum at Poltava, No. 1694).

Fig. 5, 7.

Potoczyska near Kolomyja Kozlowski, as above, 104.

Ukraine Tallgren, A. M., ESA 2 (1925), 194, fig. 108: 4.

Ukraine (before the War at the Sevčenko Museum, Lwów, No. 2505).

Fig. 5, 8.

Ukraine, 2 specimens (before the War in the Chojnowski Collection, Army Museum, Warsaw, Nos. 32585, 32566). Fig. 5, 6, 9.

Zanecin district of Lublin: at the State Archaeological Museum, Warsaw.

Stray sickles

Khmelna near Kanev. Terenozhkin, A. I., SA 1957-2, 58, fig. 6: 10; idem, Peredskifskii period, 143, fig. 95: 10.

Leplyava near Kaney Terenozhkin, as above, 144, fig. 95: 11.

Middle Dnieper region, 2 specimens. Terenozhkin, as above, fig. 6, 11, 12.

Obukhovka near Dnepropetrovsk (before the War in the Museum Dnepropetrovsk).

Fig. 5, 11.

Fig. 5, 12.

Ukraine (before the War at the Czartoryski Museum Cracow).
Ukraine, 3 specimens (before the War at the Sevcenko Museum Lwów, Nos.

Nos. 2522-2524). Fig. 5, 10, 13, 14.

Personal ornaments (from graves of the Komarów culture).

Beremiany near Buczacz Kozłowski, L., Wczesna, starsza i środkowa epoka brązu w Polsce (Lwów, 1928), pl. XIII: 1.

Bukówna near Tlumacz Siwek, I., ZOW 13 (1938), 67, figs. 1, 2.

Komarów near Halicz, mound 6.

Fig. 2.

Komarów near Halicz, mounds 8 and 28. Sulimirski, T., see footnote 1: Bulletin, fig. 1.

Putiatyńce near Rohatyn Kozlowski, as above, pl. XIII: 2, 3.

The Excavation of Gorham's Cave, Gibraltar, 1951–54

by J. d'A. WAECHTER

The preliminary report, published in 1951¹ covered the work of the first two seasons, 1948 to 1950; this final report covers the seasons from 1951 to 1952 and 1953 to 1954, the excavations having been completed in March 1954.

As in the first two seasons the excavation was financed by the Percy Sladen Memorial Fund. This grant carried the work up to January 1954 and the remaining period was financed by a generous grant from the Gibraltar Government.

STRATIGRAPHY

During the first two seasons a deep sounding was dug in the front of the cave, which reached a depth of 5 metres. The 1951–1952 season was devoted to extending the area of this sounding and no attempt was made to deepen it, as the deposit was known to be of considerable depth and the sides of trenches far from secure. It was not until the last season, 1953–1954 that it was possible to continue the excavation downwards.

The stratigraphy and archaeology of the levels reached in the original deep sounding, Layers A to N/O, were published in detail in the preliminary report and only a short summary need be given here (Fig. 1).

The first level, Layer A, contained pottery, scarabs and glass, mostly dating from Punic times; in addition to this late pottery there were a few sherds of handmade ware. It was not possible to establish a separate horizon for this earlier material as Layer A was very thin and much disturbed.²

Below Layer A was a stalagmite floor about 2 to 10 cms. thick. This was a true stalagmite and not a cemented sand; it was very hard and came away in sheets like slate: this formed a seal between the pottery levels above and the earlier material below, except where it had been broken through near the cave walls by previous excavators. Immediately below this stalagmite was a series of wind-blown sands, Layers B to F2, each of which contained implements and animal bones. In the preliminary report the archaeological material from these layers was considered

Waechter, J., 'The Excavation of Gorham's Cave, Gibraltar', Proc. Prehist. Soc., Part I, 1951.

The pottery and other objects will be published as a separate paper.

Fig. 1

as a group, but in view of Professor Zeuner's pedological report,³ they must be reconsidered. In none of them was the amount of material very great: comparison between the finds of each level is very difficult, and very little further material was added during the later seasons.

Layer B was a fairly clean sand with pieces of angular limestone and traces of charcoal, it was slightly compact at its junction with the stalagmite floor above and very hard at the base; there were no hearths.

Layer D differed markedly in colour from Layer B as it was full of charcoal and hearths occurred over most of the area. Some of these hearths were apparently lined with flat beach stones, but no definite arrangement was apparent as few of them were in their original position. Layer D was divided into two zones, the upper being the hearths and the lower the sands immediately below. Both these layers contained archaeological material.

Below Layer D was Layer E, originally divided into three. These three zones were present in the restricted area of the original sounding, but were found to be very localised when the excavation was extended and for all practical purposes Layer E can be considered as one. The sands of this layer were much cleaner than those of Layer D as there were only small grains of charcoal; parts of the deposit were cemented and were extremely hard.

Layer F was also divided into three zones, but in this case the divisions were visible throughout, though F3 tended to tail off towards the west. F1 and F3 were rather dark in colour, though neither were as dark as Layer D; F1 contained traces of small hearths, implements, bone and shells; there were also small traces of charcoal in F2, but very few implements; F3 was sterile.

This completes the upper prehistoric series, which from Layers F2 to B, produced material of Upper Palaeolithic type. The remaining layers are either Mousterian or without archaeological material.

The lower layers, G to N/O, have been described sufficiently in the earlier report not to need further description here, but in view of its importance from a chronological aspect some stress must be laid on Layer J. This layer was composed of tough brown clay and was markedly different from the sandy deposits of the other layers. Over most of the excavated area it was roughly horizontal and fairly uniform in thickness, but thickened considerably towards the walls of the cave. Near the western end it rose in a distinct hump in the East-West section. (See Plate XIII, at the base of the ladder). Layer J was divided into two parts, the upper being the tough clay and the lower, much softer, was sandier and almost orange in colour. Separating Layer J2 from the underlying Layer K, was a thin hard crust

³ Zeuner, F. E., 'The Chronology of the Mousterian at Gorham's Cave, Gibraltar', Proc. Prehist. Soc. 1953.

about 1 cm. thick which covered the whole area. It differed in composition from the stalagmite under Layer A in that it was composed largely of sand.

Layer K was tougher and darker in colour than Layer G, but it contained about the same concentration of implements, bone and shell. Between Layer K and the third Mousterian Layer, M, was a clean yellow sand, Layer L; it contained a few animal bones and shells, but no implements except at its junction with Layer K, from which they were obviously derived.

Layer M was very similar in colour and texture to Layer K, and also contained implements, bone and shells; like Layer K there was also a considerable amount of charcoal. This was the third Mousterian level. Below Layer M was a very stony layer consisting of clean sand and small angular limestone fragments. In the original deep sounding this was divided into two zones, N and O; the former being more pebbly than the latter. When the area was extended this division did not apply over the whole of it and they have been grouped together as Layer N/O. The upper part, Layer N, contained a few implements and some bone and shell, obviously derived from Layer M; Layer O contained only a few rabbit bones. The top of Layer N/O was the lowest point reached in the original deep sounding: this remained the lowest point reached until the beginning of the 1953 season when six further levels were excavated. They were as follows:

Layer P. This was much darker in colour than Layer N/O. It was comparatively thin and rose rather sharply towards the back of the cave and had a distinct dip half way along the East-West section. Although there was a considerable amount of loose charcoal there were no hearths. Throughout the layer there were implements, bone and shell.

Layer Q. This layer, in marked contrast to Layer P, was a clean yellow sand, the base was nearly horizontal but the top followed the rise and fall of Layer P. There were a few flakes, which may well have been derived from Layer P, animal bones and a few shells.

Layer R. This was made up of yellow sand with dark lenses, the dark patches being very sticky. In the front, against the south wall, the whole area was a mass of stalagmite in the form of small pillars; the majority were no longer upright but lay either horizontally or at an angle. In places in this area there were small rounded pebbles covered with a thin coating of lime; these suggest that there may have been a small spring issuing from somewhere along the south wall, which might also explain the disturbance of the stalagmite pillars. In the upper part of the layer, towards the front, there was a marked zone of small angular limestone fragments. There was some charcoal which was more frequent towards the north wall. There were no hearths in the excavated area and the amount of charcoal decreased towards the south side. The number of implements, bone and shell was very small

compared with Layers K and M, even allowing for the fact that these two layers were excavated more extensively. There is no doubt however that Layer R was an occupation level, though the major part of the occupation was probably on the northern, unexcavated, side of the cave.

Layer S. This layer was divided into three zones; S1, a dark sand, rather tough; S2, generally lighter in colour with lenses of darker, tough sand similar to S1; and S3, a very tough brown clay not unlike Layer J, but much damper and stickier.

Layer U. This consisted of white sand with black grains, the grain size being much larger than in the sands above: it was in fact the upper part of the '9 Metre' beach. The average height above mean sea level was 9.72 metres, 80 cms. higher than the similar deposit in the Devil's Tower cave; but the sand of Layer U only represents the light sand at the very top of the beach. This beach was dug to a depth of about 90 cms., but the coarser beach material was not reached. There were a few quartzite flakes at the top.

Throughout the section from Layer B to Layer R there were zones in which angular fragments of limestone occurred; in some, such as Layers B and N/O these zones were widespread, but in the others, Layers E, F1, K and the top of Layers Q and R, these pebbles were in patches, mostly towards the front of the cave. These fragments are obviously derived from the cave wall and suggest possible frost action. It is not possible however to indicate any horizon that could have been markedly colder than the others since the changing shape of the cave as the deposition increased would have had some effect on the internal conditions, but it does seem that during the whole period from Layer R to Layer B the climate was probably colder than the present day, particularly as no trace of these fragments were found in Layer A. There were also areas where the sand was extremely hard due to cementing. Nearly all the layers were hard at the very edge of the natural section, but in Layers B, E, the base of H and T this hardening was much more widespread, particularly in Layer L where it extended over the whole of the excavated area.

THE WASH

This was a scree of slipped sands at the base of the natural section. A small sounding was made on the north side as a check before dumping from the main deposit; there was no stratification and the material recovered consisted of only a few Mousterian flakes.

A small sounding was also made in the yellow sands on the south side of the entrance. These sands were soft at the top with small fragments of angular lime-stone; towards the base they became slightly stickier. The trench was carried

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down to the level of the present artificial beach, but no evidence for the presence of the Epi-Monastirian beach was found, this probably having been scoured out before the deposition of the present artificial beach, before which the sea entered the front part of the cave. The yellow sands themselves are most likely derived from the weathering of the main deposit since above them are traces of the older deposit adhering to the wall.

THE ARCHAEOLOGICAL MATERIAL

Little additional material was found from Layers B, D and E during the last seasons (1951–1954) and none which could add to what has already been published from these levels.

Layers F1 and F2

End-Scrapers. Two (Fig. 2, 3 and 7). No. 3 is a very delicately made scraper on a short flake. There is slight retouch on both sides as well as across the end. No. 7 is rougher, made on a thick flake with retouch down one side.

Steep-scrapers. Four (Fig. 2, 2, 9, 10). All four are made on chert. No. 2 is rather narrow with long, flake scars rising up to the crest; the flat base is cortex. No. 9 is much broader; the base is not flat but a flake scar across it has made it flat where the facets meet at the working edge. No. 10 is a very rough specimen made on a thick flake, with the bulb at the side opposite the retouch; the retouch is confined to the edge and does not reach anywhere near the crest.

Core-scrapers. Two (Fig. 2, 11). Both specimens are rather rough. No. 11 is an irregular lump of chert, but the working edge is quite well defined.

Burin. One (Fig. 2, 12). This is a very poor specimen, made on a chert blade with a small facet down one edge.

Blades. Four (Fig. 2, 1, 5, 6, 8). All four are on chert. No. 1 is narrow and curved with retouch up part of one edge and inverse retouch on the opposite edge. No. 5 is a broad chert blade with retouch on part of both edges. No. 6 is parallel-sided with fine retouch on one edge and across the broken end. No. 8 also has slight retouch on the end.

Retouched flakes. One (Fig. 2, 4). This is a broad flint flake with retouch on the edges; it is possibly Mousterian.

Cores. Six. One is a large disc-core of quartzite which is probably Mousterian. The remainder are small pyramidal cores of Upper Palaeolithic type; all are chert and rather rough.

Flakes. Thirty-four. There are two Mousterian flakes with prepared striking platforms; the remainder are shapeless and call for no special comment.

INVENTORY			
End-scrapers	Blades	4	
Steep-scrapers	Retouched flakes		
Core-scrapers	Cores	6	
Burins	Flakes		
Total 54			

Laver G

Points. Four (Fig. 3, 1-4). Three are made on chert and one on quartzite. Nos. 1 and 3 are quite well made, through rather thick; No. 2 is broken with the butt end and about half the implement missing. The last specimen, No. 4 is made on quartzite and is much larger than the others and rather rougher, with the bulb of a percussion on one side of the base.

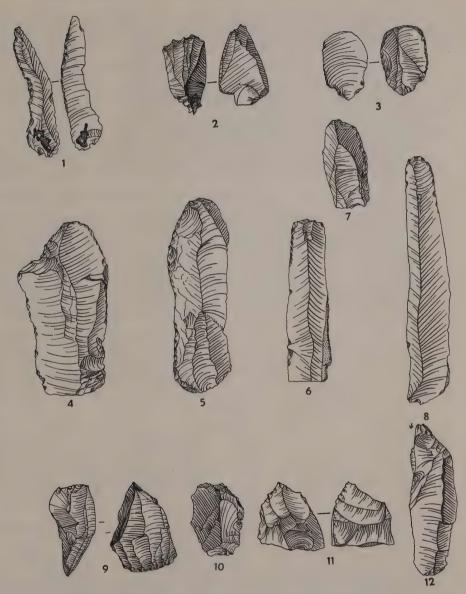


Fig. 2. Gorham's Cave, Gibraltar: flints from Layers F1 and F2 (3).

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Scrapers. Thirteen (Fig. 3, 5, 6, 7, 8, 9-11 and Fig. 4, 1-3, 5 and 8). This group represents the largest category of finished implements, all, except Fig. 4 No. 5, are side-scrapers; three are made on quartzite, the remainder on chert or jasper. Fig. 3 No. 5 is a small end-scraper made on quartzite with a well retouched end.

Burins. Three (Fig. 4, 7). The figured specimen, like the other two, is made on quartzite; all

are single-blow and very rough.

Blades. Three (Fig. 4, 9-11). These are all made on chert and all three have roughly prepared striking platforms; only one, No. 10, has any retouch, though the other two are slightly abraded through use.

Flakes with inverse retouch. Eight (Fig. 4, 4 and 6). These are on both chert and quartzite; only

the two illustrated specimens have the retouch down the whole length of the edge.

Retouched flakes. Twenty (Fig. 4, 12). This is a group of rough flakes, mostly on quartzite, with definite retouch on part of the edge. Some specimens have the whole of one edge retouched, but they are too rough and irregular to be included in the scraper group. One specimen is made on grey granite.

Utilized flakes. Sixty-seven. These are flakes with signs of use on part of the edge and call for

no special comment:

Cores. One hundred and fifty. Of these only nine were tortoise cores, i.e. prepared by multi-directional flaking for the removal of one main flake, and all nine specimens were rather rough. Of the remainder, some were beach pebbles with one or two flakes detached and the others are rather shapeless lumps, mostly of quartzite. The characteristic core however is a small disc, about 3-4 cms. across, worked on both faces; these presumably represent the worked down minimum of a much larger core. That flakes should be struck from so small a core, some under 3 cms. across, suggests that the local raw material was not readily available. There are also ten specimens of what might be called 'flake cores'. In these the upper face is covered with large flake scars and the lower face, which is a flake surface, has several flake scars on it. One specimen has been prepared as a tortoise core.

Flakes. 4,965. Of these 218 have prepared striking platforms. This preparation of the platforms is generally very rough and many have only two flake scars, though a few are more elaborate. Many of the prepared flakes are extremely small, again suggesting the possible shortage of suitable material. The angles of the unprepared platforms are nearly all approximately 90°, and only eleven specimens have platform angles markedly in excess of this. All these high-angle flakes are quartzite. In addition there are a number of rounded beach pebbles, some used as hammer stones, and several small quartz pebbles and pieces of mica-schist.

	INVENTO	DRY
Points	4	Retouched flakes
Scrapers	13	Utilized flakes
Burins	3	Cores
Blades	3	Flakes, prepared platforms218
Flakes with inverse retouch	8	Flakes, plain platforms
	Total 5,	233

Laver H

Layer H, which was mainly sterile, produced nineteen flakes and two cores, all came from the upper part and obviously derived from Layer G above.

Laver K

Points. Five (Fig. 5, 1, 3 and 9). No. 3 is a very delicately made point on a small flint flake, only 0.4 cms. thick; it is carefully worked with flat retouch up both sides, and the striking platform, which is very small, is prepared. No. 1 is not very typical of a Mousterian point, but this would

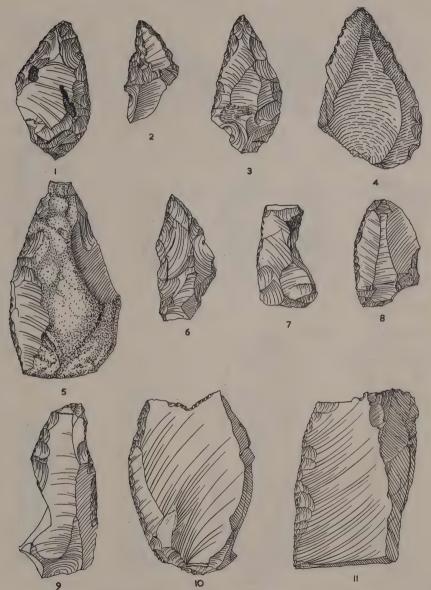


Fig. 3. Gorham's Cave, Gibraltar: flints from Layer G (3).

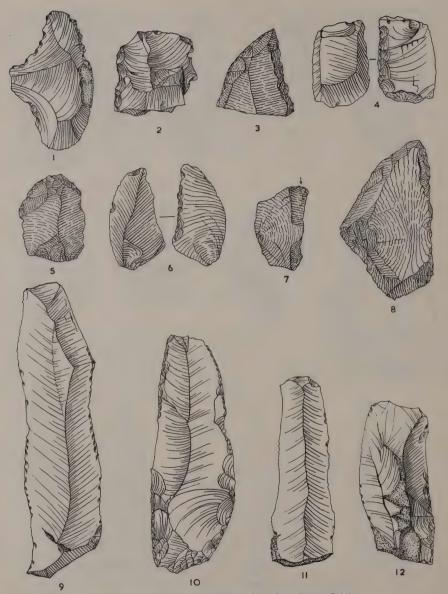


Fig. 4. Gorham's Cave, Gibraltar: flints from Layer G (2).

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appear to have been its function. It is made on a leaf-shaped flake with the pointed end accentuated by retouch on both edges; the striking platform is plain. No. 9 is made on quartzite and is very rough.

Scrapers. Fifteen (Fig. 5, 4-8, 12, 14, 16 and Fig. 5, 11). With the exception of Fig. 4, 14, these are all side-scrapers. A few, like Fig. 5, 4 and 5, are very neatly made, the former particularly so; the remainder are rather rougher. Fig. 5, 12 and Fig. 5, 11 are made on quartzite; the remainder are made on chert.

Burins. Eight (Fig. 5, 2 and Fig. 6, 2). These are all single-blow and made either on chert or quartzite.

Flakes with inverse retouch. Two (Fig. 6, 3 and 4). No. 3 is made on chert and the other on quartzite. No. 3 is retouched on both edges.

Blade flakes. Eleven (Fig. 5, 13; Fig. 6, 7). These are narrow flakes all showing signs of use on the edges. Although the blades from Layer G are technically blade flakes, they are generally much larger and more distinctive than those from this level; No. 7, the largest specimen, is made of quartite.

Retouched flakes. Two. One is a square flake of green jasper with steep retouch up both sides and across one end, the other is a large chert flake with cortex over most of the upper face and one edge roughly serrated.

Ūtilized flakes. Twenty-nine. A group of flakes all showing signs of use on the edges but without retouch.

Cores. Seventy-five (Fig. 5, 15; Fig. 6, 6, 8-10, 12 and 13). Twenty-nine of these are tortoise cores, many of them are very neatly made and quite small, the smallest being 2.7 cms. across. In most cases they are made on beach pebbles. Two specimens are unusually thin being only 1.7 and 1.8 cms. thick. There is one very large disc core, 7.7 cms. across and very regular. Fig. 6, No. 9 is a small disc-core which has been worked down to its limit. The raw materials for these cores are chert and quartzite.

Flakes. 1,351. 193 have prepared striking platforms: most of this preparation is rather rough. The remainder call for no special comment.

Various. One (Fig. 5, 11). This is a long narrow flake, rather thick, with steep retouch up both edges, the point is broken off.

As with Layer G there are a number of beach pebbles, some obviously used as anvils, and one long pointed stone much battered at one end.

INVENTORY					
Points5	Retouched flakes				
Scrapers	Utilized flakes				
Burins8	Cores				
Flakes with inverse retouch	Flakes, prepared platforms				
Blade flakes					
Total 1 498					

Laver L

This material, like that from Layer H, is probably derived from the layer above.

Point. One. This is a pointed flake of chert with a faceted striking platform; there is a flat inverse retouch down the whole of one side. This specimen is not as extensively retouched as those from Layer K, but is probably intended as a point.

Utilized flake. One. A nearly triangular flake with signs of use on one edge.

Cores. Eight. Two are small tortoise cores, both very small and well made; the others are rough chunks.

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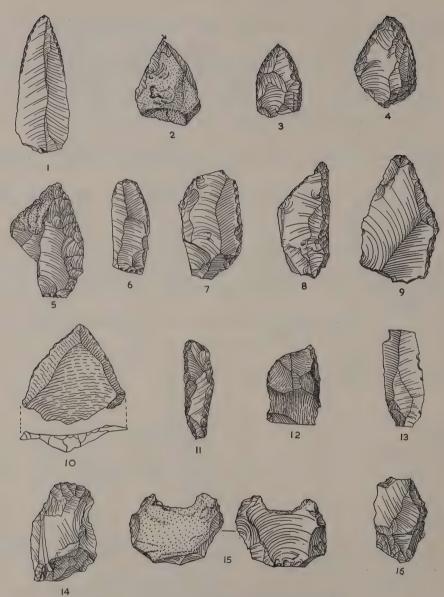


Fig. 5. Gorham's Cave, Gibraltar: flints from Layer K (3).

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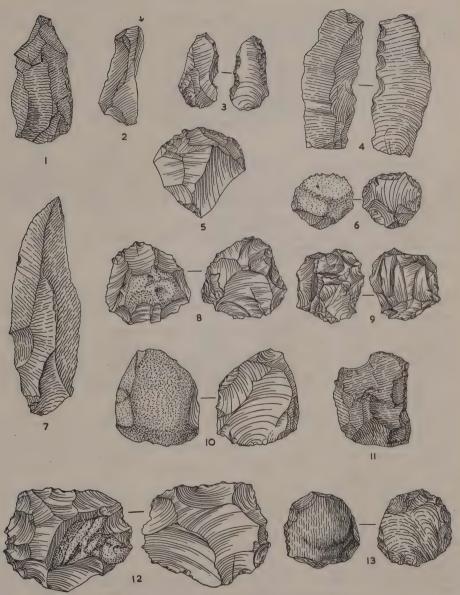


Fig. 6. Gorham's Cave, Gibraltar: flints from Layer K (4).

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Flakes. 116. Twenty-four have prepared striking platforms, the others call for no special comment. There are also a number of beach pebbles.

INVENTORY						
Points						
Utilized flakes1						
Cores8						
Flakes, prepared platforms24						
Flakes, plain platforms92						
Total 126						

Layer M

Side-scrapers. Three (Fig. 7, 3-5). Two, Nos. 3 and 4, are made on green jasper and the third on quartzite; all three are rough when compared with the specimens from Layer K. The quartzite specimen, No. 5, is a narrow flake with one edge curved throughout its length. The retouch, which is semi-steep, is down the whole of the curved side; the opposite edge has slight retouch in the middle.

End-scrapers. One. This is technically an end-scraper, but is probably accidental; it has rough steep retouch across one end. On the lower face below this retouch two large flakes have been removed, making the working edge thinner.

Burins. Two (Fig. 7, 7 and 8). Both are single-blow burins made on chert. No. 8 has been resharpened.

Flakes with inverse retouch. Eleven (Fig. 7, 1, 2, 10–12). This is quite a consistent group. Nine are made on chert of various colours and the remaining two are on quartzite. In some cases the retouch is quite well made, mostly on one edge only. One specimen, No. 2, has retouch on the upper face on the opposite edge to the inverse retouch.

Retouched flakes. Three. Two are on chert and the third on quartzite; all are irregular flakes with some retouch on part of the edge.

Blade flakes. Nine (Fig. 8, 5). This is a group of narrow flakes, many with signs of use on the edges. The number found is not very significant as they merge into ordinary flakes. The specimen illustrated, made on quartzite, has a very small plain striking platform.

Utilized flakes. Forty. This group, as in the other layers, consists of flakes with signs of use on the edge.

Cores. Seventy-eight (Fig. 7, 6; Fig. 8, 1-4, 6 and 7). These cores are made on a variety of materials, but in nearly all cases they are derived from beach pebbles. Twenty-eight are tortoise cores, some, for example Fig. 8, 3 are very beautifully made. The majority are very small, ranging from 2.7 cms. to 6.2 cms. across; there is a tendency for the quartzite specimens like Fig. 8, 6 to run to a larger size than those made either on jasper or chert. One very large specimen, Fig. 8, 7, is unstruck. One small jasper core is worked on one face only from a flat base, making a small core of Upper Palaeolithic type.

Flakes. 1320. 302 have prepared striking platforms. This figure is very high compared with the two previous Mousterian layers, G and K; the increase is even more striking when it is realised that the excavated area of Layer M is less than a third of Layer G.

INVENTORY						
Side-scrapers	3	Blade flakes9				
End-scrapers	1	Utilized flakes				
Burins		Cores				
Flakes with inverse retouch	11	Flakes, prepared platforms				
Retouched flakes	3	Flakes, plain platforms				
Total 1467						



Fig. 7. Gorham's Cave, Gibraltar: flints from Layer M (3).

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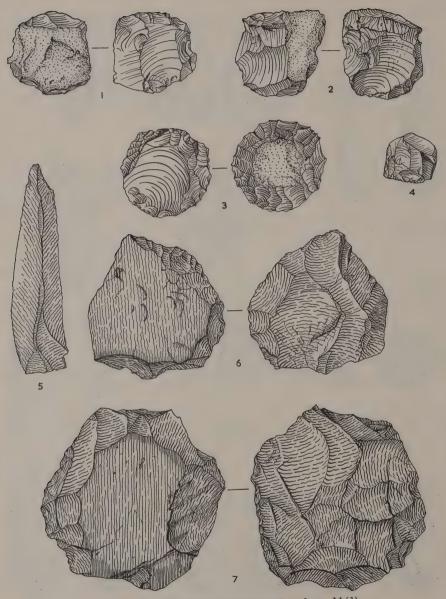


Fig. 8. Gorham's Cave, Gibraltar: flints from Layer M ($\frac{4}{3}$).

THE EXCAVATION OF GORHAM'S CAVE, GIBRALTAR, 1951-1954

Layer N/O

The material from this layer is very scanty and consists of one single-blow burin; seven utilized flakes; ten cores, all shapeless lumps; and 141 flakes of which twenty-one have prepared striking platforms. There is little doubt that this material is derived from Layer M.

Laver P

Although this was obviously an occupation level with evidence of hearth material, the number of artifacts recovered was very small, this was partly due to the fact that the layer itself was very thin and also the excavated area was becoming much reduced. The total consisted of 471, which was made up as follows: two single-blow burins, both rather rough; twenty utilized flakes; twenty-two cores of which three were well made tortoise cores; and 420 flakes of which seventy-one had prepared striking platforms.

Laver O

This layer produced five utilized flakes: one, Fig. 9, 3, is 11.5 cms. long and 5.7 cms. wide with retouch on one edge and signs of use on the other, with plain striking platform; three cores, all rather shapeless; and thirty flakes, seven of which have prepared striking platforms.

Layer R

This layer, like Layer P, is an occupation layer though the evidence on the south side of the cave is slight. The only artifacts were a small rough side-scraper, Fig. 9, 1; two untouched flakes; five rather shapeless cores and thirty-six flakes, Fig. 9, 2 and 4. Eight of the last had prepared striking platforms.

Layer S1

There were fifteen flakes, two with prepared striking platforms; it is possible that they were derived from the layer above as there was no evidence of occupation.

Layer T

This layer produced only fine flakes, two of which were from a prepared core.

Layer U

Layer U is the top of the beach and consists of fine beach sand. There was no evidence of occupation in the form of charcoal, but by this time the area of excavation was very small. There is no likelihood of the archaeological material having been derived from occupation layers above, such as Layer R and it can be assumed that the material here and probably from Layer T also is in place. There were two flakes, Fig. 9, 5 and 6, both made of quartzite; and two cores, one only a fragment, the other a complete tortoise core, Fig. 9, 7.

THE RAW MATERIAL

Two sources of raw material are available on Gibraltar: brown and grey quartzite from Buena Vista, between Europa Point and Rosia, and black chert which occurs in bands in the limestone at North Front between the Devil's Tower and Forbe's Quarry. These bands of chert have been subjected to considerable movement since their deposition and as a result are badly fractured so that only comparatively small pieces were available. This chert forms the greater part of the raw material used in the upper levels, Layers B to F2, where the industries are small. There is also a cream coloured chert from these levels but its source is not known.

The brown and grey quartzite, which was the main material in the Mousterian levels, although occurring *in situ* around the corner from the cave, seems to have been obtained mostly in the form of beach pebbles, as is shown by the cortex of

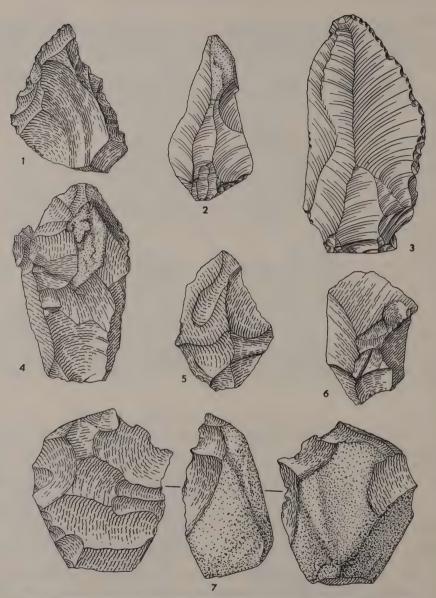


Fig. 9. Gorham's Cave, Gibraltar: flints from Layers Q (3), R (1, 2, 4), and U (5-7) (1/2).

many of the cores. It is probable that the green jasper is also derived from the beach. The pale green chert used in Layers G and K appears to have been obtained *in situ* as the cortex, where visible, is not rolled; but the source of supply is not known.

SUMMARY AND CONCLUSIONS

If Professor Zeuner's interpretation of the strata is accepted then the archaeological material ranges in time from the retreat of the sea following the deposition of the Monastirian II beach, which was laid down at the end of the Last Interglacial, to the final return of the sea to its present level at the end of the Postglacial.

The presence of flakes at the very top of the beach suggests that a casual occupation started when the sea had retreated only a little way below present level and the foreshore was still very narrow. The considerable accumulation of wind-blown sand which makes up Layers R to K indicates a very much wider foreshore, since it was from this foreshore that the sand was derived. It is not possible to tell from the section at what point the sea reached its maximum fall, but probably by the time Layer K was being laid down the sea was already re-advancing, reaching a height of some 4 metres above present level, which is represented in the section by Layer J.

On the basis of low sea-levels coinciding with cold conditions Layers T to K range in time from the beginning of the drop in sea level following the deposition of the Late Monastirian beach to just before the high sea-level of the interstadial Würm I-Wüm II. If this Epi-Monastirian 4 metre beach corresponds to this interstadial then the occupation of Layer G probably took place well into the cold phase of Würm II as the sea-level would have had to drop 4 metres to present sea-level, plus a further 3 or 4 metres to make the cave accessible.⁵

The following high sea-level, that of the interstadial Würm II-III, does not appear to have reached quite as high as the present level, so that as far as the cave was concerned access was possible until the sea reached the base of the cliff in modern times. But although the accessibility of the cave is no longer a guide to the chronology, the composition of Layer E, with the indication of a marked reduction of sand content, suggests that this represents the high sea-level of Würm II-III, so that the Mousterian of Layer G and the Upper Palaeolithic of Layers F2 and 1 occurred before this cold phase.

⁴ Zeuner, F. E., op. cit.

It would require a drop of about 2-3 metres below present sea-level to be able to walk round from the Neutral Ground (Admiralty Chart 1: 10,000).

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The chronological position of the later levels, Layers D and B, is not very easy to establish, but the fact that they were also composed of wind-blown sand like the previous occupation levels suggest that the sea was again in retreat after the laying down of Layer E, a fall in level which one would naturally expect to coincide with the return of cold conditions of Würm III, though probably only the material from Layer D itself belongs to this phase.

There is no evidence as to when the sea returned to its present position, which is represented in the section by the stalagmite layer between Layers B and A, but as the deposition of sand which made up Layer B appears to have been continuous with that of Layer D, Layer B was probably not much later in time than Layer D.

The archaeological material can be divided into several groups. Layers U to K form one chronological unit; and while there is insufficient material from the layers below M to make much of a comparison with the more plentiful finds from Layers M and K, the presence of a prepared core from Layer U (Fig. 8, 7) suggests that these lower layers are also Mousterian. Layer K appears to be a little richer in finished implements than Layer M, but this is probably because the excavated area of Layer M was much reduced. In general the two layers are very similar, particularly in the treatment of their cores.

The second Mousterian group, Layer G, is separated from the lower series by a complete interstadial represented by Layer J. Such an interval of time would suggest that there might be some difference between the industries of these two groups; this is in fact the case, though it is not easy to demonstrate with a small series. Although the finished implements, such as the scrapers, are very similar in both, those of the lower series are generally smaller and rather better made. The distinguishing feature of Layer G however is the presence of large blades and the very low percentage of prepared cores, which, when they do occur, are greatly inferior to those from Layers K and M. In spite of the comparative lateness of Layer G there is no evidence of Upper Palaeolithic influence nor is there any suggestion of Aterian elements: Layer G is as characteristically Mousterian as Layers K and M.

Attention has already been drawn to the Upper Palaeolithic appearance of the material from Layers F1 and F2. Unfortunately very little material was added during the last seasons so that the dating of the industry typologically is still uncertain. It is probable that these two layers represent the same industry and that they are radically different from the Mousterian below. There is enough difference between the industries of Layers F and D to justify their being separated and the chronology indicates that they are separated by a long period of time. The typological evidence also makes it clear that Layers D and B should also be separated and not considered as one industry as in the previous report,

since the small steep-scrapers and core-scrapers of Layer D are virtually absent in Layer B, where the microlithic element seems to be more pronounced.

The comparison of the finds from Gorham's Cave with neighbouring sites is extremely difficult, partly because of the limited number of sites in southern Spain covering the same time range and also because of the poor quality of the raw material available in Gibraltar. The fact that the lower part of the Mousterian deposits from the Devil's Tower⁶ rests directly on the Monastirian II beach suggests that the lower levels of this cave are contemporary with the early levels of Gorham's, Layers U and T and possibly Layer R. There is however no sign of a break in the Devil's Tower sequence which would correspond to Layer J; and from Miss Garrod's Layer 6, which is the top of the fossil beach, to the fine sands of Layer I, the occupation appears to have been continuous, unless the calcareous tufa of Laver 2a is the equivalent of Laver J and Laver I represents the same sands as Layer G. It seems very unlikely that access to the Devil's Tower was unaffected by the Epi-Monastirian high sea-level, which, as the Gorham's Cave evidence shows, must have reached about 4 metres above present level, and probably covered the greater part of the low-lying Neutral Ground. The very truncated appearance of all the levels from the Devil's Tower, excepting Layer I, and the resulting absence of talus, particularly in the lower levels, suggest that they might well have been subjected to marine erosion subsequent to their deposition. If this is the case then the whole of the Devil's Tower sequence, excepting Layer I, would be of the same age as the series from Layer U to Layer K in Gorham's Cave.

A comparison of the archaeological material from the two sites suggests that Layers 6 to 2a of the Devil's Tower follow the same pattern as Layers U to K of Gorham's Cave. Both series start with a rather rough industry followed by a well made typical Mousterian and there seems little doubt that both series are contemporary. The industry from Layer I of the Devil's Tower consists only of six rough quartzite flakes and two bone 'compressors' so no comparison is possible with Layer G.

On the Spanish mainland there are several localities which have produced Mousterian material, but only three sites in southern Spain have been extensively excavated; Cova Negra (Bellus) between Valencia and Alicante, excavated by Francisco Jorda: Cova de la Pechina in the same valley, also excavated by Jorda and La Cueva del Cochino between Aliñante and Almansa, excavated by Jose Maria Soler. Of these three sites the longest sequence is that of Cova Negra (Jorda

⁶ Garrod, D. A. E., 'Excavations of a Mousterian Rock-shelter at Devil's Tower, Gibraltar', *Jour. Royal Anth. Inst.* Vol. LVIII, 1928.

Jorda, Francisco 'El Musteriense de la Cova de la Pechina (Bellus)' Communicaciones del S.I.P. al I Congreso del Levante Espanol; Trabajos varios del Servicio de Investigacion Prehistorica de la Excma. Diputacion Provincial No. 10 (Valencia, 1947).

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1945 and 1953 ^{6b}). The depth of this deposit is just over 5 metres and Jorda distinguishes six archaeological levels, the upper three separated from the lower by a sterile deposit of red calcareous clay, 80–100 cms. thick. The three upper archaeological levels, A, B and C are comparatively rich in material, but the lower levels, E, F and G, are rather poor. Except for Layer C with remains of *Elephas isolensis* and *Rhinoceros merckii*⁷ and Layer B, also with *R. merckii*, the fauna throughout consists mainly of *Equus*, *Cervus* and *Bos*.

From the base up the archaeological material is described as follows (Jorda 1953): Layer G, very little material. Layer F, Mousterio-Tayacian. Layer E, numerous scrapers and triangular points, a high percentage of plain striking platforms, though there are a few with prepared platforms. Layer C, Mousterian of Acheulian tradition with two hand axes, stronger Levallois elements and triangular points. Layer B, Levalloiso-Mousterian with abundant scrapers and points. Layer A, Evolved Levalloiso-Mousterian with traces of later elements. The three upper levels contain a well made Mousterian, which, with the exception of the two hand-axes from Layer C, is very similar to the upper series from Gorham's cave, Layers M to G (the small differences between Layers K and G are not apparent in Còva Negra). The presence of a rough industry below the typical Mousterian at Còva Negra, Layers E, F and G, produces the same pattern as at the Devil's Tower and Gorham's cave.

At Cova de la Pechina, only a short distance from Còva Negra, the lower series are absent and the two Mousterian layers contain a well made industry with points and scrapers similar to the upper series from Còva Negra. Jorda compares the earlier of the Pechino industries with Còva Negra C but describes the later as being more advanced. The fauna of the upper layer, Layer I, consists of *Equus*, *Ovis*, *Cervus* and *Bos*, with, as the excavator remarks, certain reserves, as it was very fragmentary. The fauna from the earlier level was substantially the same.

The third Mousterian site in this area, La Cueva del Cochino, like Pechina, contained two typical Mousterian levels which can be compared with the upper layers of Còva Negra (Soler 1956^{7a}). In Soler's analysis of the material both levels are considered together. From these 1,610 pieces were recovered. The percentage of points to scrapers in both levels is high, 41 to 31 in the upper and 149 to 70 in the lower; from the total of recovered pieces 556 had prepared striking platforms, a percentage of 34. The fauna has not yet been described.

⁶b Jorda, Francisco 'La Cova Negra de Bullus (Jativa) y sus industrias liticas' Archivo de Prehistoria Levantina II (Valencia, 1945). 'Parietal Neandertalense de Cova Negra' Servicio de Investigacion Prehistorica No. 17 (Valencia, 1953).

⁷ Layer C also produced the parietal bone of a Neanderthal (Miguel Fusté Ara 1953).

^{7a} Soler, J. M., 'El yacimiento musteriense de la Cueva del Cochino (Villena, Alicante' Serie de Trabajos Varios del Servicio de Investigacion Prehistorica de la Excma. Diputacion provincial de Valencia, No. 19 (Valencia, 1956).

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The nearest site for comparison with the Upper Palaeolithic levels from Gorham's Cave is Hoya de la Mina near Malaga, excavated by Miguel Such in 1917.8 There are three main archaeological levels, the upper with pottery, the middle which Such calls '? Tardenoisian' and the lower or 'Capsian'; between the first two there is a mixed layer. The industry from the lowest layer, the 'Capsian', consists of end-scrapers; burins of various types, including angle-burins; and rather irregular backed blades, the greater part broken and none which could be properly described as Gravettian. In addition there are three well made steep-scrapers, two rather broad and the third narrow. The bone industry consists of a broken point, a boar tusk with two holes and what appears to be a fish hook in bone.9 The fauna comprises dog, wild boar, rabbit and ibex in the upper part and horse, wild cat (ferox) and wild boar in the lower.

The middle level, the '? Tardenoisian', consists of small blades, very narrow, with blunted backs; scrapers on the end of short flakes; end-scrapers, sometimes double, on narrow blades; and borers with long well defined points retouched on both sides, one with a hollow base; and two oblique angle-burins. The only bone tool is a polisher and there is a fish hook made from the base of a limpet shell.

As this site lies only about sixty miles eastwards along the coast it is the obvious one for comparison with the upper levels from Gorhams. Starting with Layers F1 and F2 it is clear that these two have some things in common with the lowest level at la Mina, though the comparison is by no means exact. The steepscrapers from Gorham's, Fig. 1, 2 and 3, are closely paralleled by Lam XV, 5 and Lam XVI, 1 and 2 of Hoya de la Mina, and the blades of F1 and 2 also show some similarity, though there is much less evidence of blunting. One implement which is present at la Mina but is absent in Gibraltar is the angle-burin, which at the former site is quite well made. It is also possible to make a comparison between the lowest level of la Mina and Layer D. Here there are steep-scrapers, though not so well made as in the layers below, one angle-burin, No. 19; end-scrapers on short flakes, Nos. 21, 22 and 27; and blades which are nearer in size to those from la Mina. Taking into account that the lower levels of la Mina as well as the two layers under discussion from Gorham's are very deficient in material so that the comparison between the two sites is rather insecure, the match between the lowest level at la Mina and Layer D seems to be the more reasonable.

Any comparison between Layer B and the middle or 'Tardenoisian' level of

⁸ Such, M., 'Hoyo de la Mina, 1919–1920', Boletin de la Sociedad Malaguena de Ciencias.

Such, M., Lamina XIX.
 Waechter, J., op. cit. Fig. 3, Nos. 14-31.

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la Mina is nearly impossible, but neither have geometric implements and both have small backed blades.¹¹

Reviewing the succession in southern Spain as a whole, it is clear that typical Mousterian industries are well represented, as is shown by the upper levels of Còva Negra, Còva de la Pechina and La Cochino, as well as in numerous surface sites. This well-made Mousterian is present in two sites in Gibraltar, the Devil's Tower and Gorham's, where in the latter it occurs not only during Würm I, but continues with only small modifications into the following cold phase. Below this typical Mousterian there is a group of at present rather ill-defined industries which have been variously described as Old Mousterian or Tayacian. If the material from the lower layers of Gorham's Cave, Layers U to R, belongs to the same facies as the lower levels of Còva Negra, then it would appear on the chronological evidence provided by Gibraltar that these industries began at the very beginning of the cycle which culminated in Würm I.

Unfortunately Gorham's Cave is the only one at present excavated which has Upper Palaeolithic superimposed on the late Mousterian and this material is rather inadequate. With the possibility of there being a gap, the sequence can to some extent be continued in the cave of Parpallo.¹² Here, at the base of the Solutreo-Magdalenian sequence, is an industry with blunted backed blades and endscrapers, the blades similar to the Gravettian of the Franco-Cantabrique region; this industry is followed by the Solutrean and Magdalenian. Not very far from Parpallo is the cave of Mallaetes, where the Upper Solutrean with tanged points is followed by an industry with small backed blades and end-scrapers to which Pericot has given the name Epi-gravettian and which he suggests is contemporary with the Magdalenian levels from Parpallo.¹³ If this Epi-gravettian is in fact contemporary with the Magdalenian then it would appear that there are two lines of development in south eastern Spain, following the Upper Solutrean; the Epigravettian which is a local development and the Magdalenian from the north, with a rather restricted distribution. There appears to have been no Chatelperronian nor Aurignacian in the region. Pericot includes the 'Tardenoisian' from La Mina in his Epi-gravettian, which leaves the lower levels of La Mina unaccounted for. The evidence from Mallaetes clearly shows the position of the Epi-gravettians, as being above the Upper Solutrean which is known to extend as far south as Almeria and its absence at La Mina could be either that 'Capsian' is a slightly older form of the Epi-gravettian or that it represents the older Gravettian from the base of

Pericot, L., La Espana Primitva, Varcelona, 1950.

Waechter, J., op. cit. Fig. 3, Nos. 8 and 9 and Lamina X, Nos. 1 to 10. The borers shown in Lamina XI, Nos. 5 to 7, are absent in Gibraltar.

Pericot, L., La Cueva del Parpalló (Gandia). Consejo Superior de Investigaciones Científicas, Madrid. 1942.

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Parpallo, in which case the Solutrean could belong either above or below the 'Capsian'. There seems no valid reason, even in view of the presence of steepscrapers both at La Mina and Gorham's, to consider this 'Capsian' as being Aurignacian, since taken as a whole it bears little or no resemblance to the Aurignacian of the French caves.

The early series of paintings from the cave of La Pileta, near Rhonda, 14 and possibly the horse head from Las Palomas¹⁵ have never been dated archaeologically, but in view of the increasing evidence for locally developed Gravettian industries in southern Spain it is probable that they belong to this stage.

While it is obvious that a great deal of further work is required in this area, which shows evidence of being somewhat complicated, there appears to be no support for the idea of African influence from either the Aterian or the Capsian.

¹⁵ Breuil and Burkitt, Rock Paintings of Southern Andalusia, Oxford, 1929.

APPENDIX I

PRELIMINARY REPORT ON THE MAMMALIA OF GORHAM'S CAVE, GIBRALTAR

by F. E. ZEUNER and A. SUTCLIFFE

Since the publication of the first report on the important excavations in Gorham's Cave¹ and on its chronology² additional faunal remains have been obtained by Dr. Waechter, mainly from levels Q to U. The character of the fauna, however, has not been affected by the new material, and only one species, the mole, has to be added to the list given in 1953. On the other hand, it has become doubtful whether any ibex of the Spanish type was present at all, the variation observed in the Alpine species being so wide that it covers the Gorham's Cave specimens.

The composition of the fauna may be summarised as follows, the species being given in their order of frequency:

LEVEL A (Post-Glacial): Oryctolagus cuniculus (Rabbit), Capra ibex (Ibex), Lynx 1. pardina (Spanish Lynx). Cervus elaphus (Red Deer).

LEVEL B-D (Last Glaciation III): Rabbit, Ibex, Lepus sp. (Hare), Whales, Red Deer, Halichoerus grypus (Grey Seal), Canis lupus (Wolf), Spanish Lynx, Sus scrofa (Pig), Bos primigenius (?) (Aurochs), Homo sapiens (Man), Rodents, Felis silvestris (Wild Cat), Equus caballus (True Horse), Monachus monachus (Monk Seal), Panthera leo (?) (Lion).

¹⁴ Breuil, Obermaier and Willoughby Verner. La Pileta, Institut de Paléontologue Humaine. Monaco, 1915.

Waechter, J., 'Excavations at Gorham's Cave, Gibraltar', Proc. Prehist. Soc. (n.s.) 17 (1951), 83–92.
 Zeuner, F. E., 'The Chronology of the Mousterian at Gorham's Cave, Gibraltar', Proc. Prehist. Soc. (n.s.) 19 (1953), 180-188.

GORHAM'S CAVE: Table showing the stratigraphical distribution of the animal remains

		A	В	С	D	Е	F	G	Н	I	J	K.	L	M	N	0	P	Q	R	S	T	U
1	Homo cf. sapiens —Man.	-	3	1	į		1	-		-	-	-	1		-	-	-	1	-			-
2	Erinaceus sp. —Hedgehog.	1	-	-		-	-	1	-	-	-	-	-	1	-	7	1	-	1			-
3	Talpa sp.—Mole.	na.		-	-	-	-	1			-	-	-	-	1	-	-	-		-	_	I
4	Canis lupus Linn. —Wolf.	_	2	-	3	-	-	-	-	-	-	2	_	1	-		1	-	-	-	-	-
5	Ursus arctos Linn. —Bear.		-	-	1	-		-	-	-	-	3	1	1		-	1	1	-		-	
6	Crocuta crocuta (Erxleben)—Hyaena.	-	Ī	-	-	-	-	5	-	-	-	5	-	4		-	1	1	-	-	1	-
	? Ditto (coprolites)	-			_		4	2		1		21	1	2	1	-	1		3	-	-	-
7	Felix silvestris Shreber—Wild Cat.	-		-	2	1	-	1	-		-	_	-	1	1	-	-	-	nun.		-	-
8	Felis lynx pardina Temminck —Lynx.	1	-		5	-	1	5		-		2	-	2			1	1	1	-	-	
9	Panthera pardus Linn. — Leopard.	-				-	-	1			-	6	-	2	_	-		2	-	-	-	L
10	? Panthera cf. leo —Lion.		?					?		-	-	?	-	-	-	-	-		-		-	-
11	Halichoerus grypus Fabricius—Grey Seal.	-	-		6		-	-	-	-	_	-	_	-	-	_	?	`			-	-
12	Monachus monachus Hermann. — Monk Seal.	-	-		1	-		-	_	-	-		~=			-		Branch.	-	-	-	-
13	Dicerorhinus sp. —Rhinoceros.	-		-	_	-		_	1	-	1	2	-	1	-	-	-	-	-	-	-	-
14	Equus caballus Linn. —Horse.	-	-	-	1	-	-	2	-	-	-	-	_	8	-	-			1	-	***	-
15	Sus scrofa Linn. — Pig.		2	-	2	-	-	-	-	-		-	2	_	4	_			1	-	1	-
16	Cervus elaphus Linn. — Red Deer.	1	7	-	26	3	-	52				29	1	53	4	-	10	1	9	-	3	1
17	Bos cf. primigenius Bojanus.—Ox.	-	3	-	1	-	-	5	-		-	5		11		-	1	1	-	-		-
18	Capra cf. ibex —Ibex.	20	49	2	54	3	4	11	-	-	-	162	_	132	6	_	30	2	1	-	1	1
19	Oryctolagus cuniculus Linn.—Rabbit.	55	171	15	447	49	50	94	5		5	187	21	178	30	-	52	17	56		3	1
20	Lepus sp.—Hare.	-	1	-	11	_	_	-	-	-	-	E	-	-	-	-	-	-			-	-
21	Rodentia.	-	1	-	1	-	_	_	-	-		-	~		-	_	_	-	-	-	~	-
22	Cetacea—Whales.	-	6	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: The apparent rarity of bones in the lower strata is due to the smaller area excavated.

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LEVEL E: Rabbit, Ibex, Red Deer, Wild Cat.

LEVELS F-H (Last Glaciation II): Rabbit, Red Deer, Ibex, Crocuta crocuta (Spotted Hyaena), Spanish Lynx, Aurochs (?), Horse, Dicerorhinus sp. (Rhinoceros, not Woolly), Panthera pardus (Leopard), Wild Cat, Erinaceus sp. (Hedgehog), Lion (?).

LEVEL J: Rabbit, Rhinoceros, Hyaena, possibly all derived from K.

LEVELS K-U (Last Glaciation I): Rabbit, Ibex, Red Deer, Hyaena, Aurochs (?), Leopard, Horse, Pig, Spanish Lynx, *Ursus arctos* (Brown Bear), Wolf, Rhinoceros, Wild Cat, *Talpa europaea* (Mole), Grey Seal (?).

The only species occurring in large numbers are rabbit, ibex and red deer, followed by hyaena. The picture is so monotonous throughout that one cannot but infer that the climate was much the same during the three low-sea-level phases here identified with the three phases of the Last Glaciation.

The climate was that of the temperate European forest. There is no African influence, for hyaena, lion and leopard were common in Pleistocene Europe. Summers cooler than those prevailing at the present are suggested by the presence of the Grey Seal in level D. Possibly the ibex is in the same class, but this is not certain, as the species appears to have withdrawn from many areas including plains, which it used to inhabit in the Pleistocene. It should be remembered that the Siberian sub-species of ibex is today an animal of lowland woods as well as of mountains.

In level G, red deer is more abundant than ibex, but one cannot interpret this difference climatically. It may be that the Mousterian hunters of that period had specialised in the pursuit of the first species.

Carnivores are relatively abundant in level K. Since plenty of coprolites of hyaena are present as well as remains of juvenile hyaena, it appears that the cave was temporarily abandoned by man and served as a den for carnivores. The same applies, to a lesser degree, to level M.

From level G upwards, the fauna becomes impoverished; especially hyaena and leopard disappear. On the other hand, the hare appears for the first time in level D. In the cave of Toll, Catalina, too, this species is a late addition to the fauna.³

There is no alternative to the inference that levels U-K, H-F and D-B represent three separate phases of *low* sea-level, when a coastal platform was exposed on which the animals could live and from which sand could be blown into the cave. In times of high sea-level, as exemplified by present-day conditions, the cave is inaccessible to terrestrial mammals. For these morphological reasons, and also because the cave of Toll (42 degrees North East) lies 750 metres above sealevel, a correlation of the sandy layers (as suggested as a possibility by Donner and

Donner, J. J. and Kurtén, B., 'The floral and faunal succession of "Cueva del Toll", Spain', Eiszeitalter u. Gegenwart, 9 (1958), 72-82.

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Kurten) is inadmissible. Gibraltar lies as much as 6 degrees farther to the south and has a Mediterranean climate, whilst the Cueva del Toll has a temperate European one. During the glacial phases, the climate of Gibraltar would have assumed the character of a Mediterranean pluvial⁴ whilst the Cueva del Toll would have become cold-continental. This is borne out by the respective faunas. The sand accumulation in Gibraltar was of a coastal dune type, that of Toll periglacial.

The fauna of Gorham's Cave is, thanks to the care that has been taken in the collection of the remains, for the time being the most important Pleistocene fauna of the Mediterranean littoral, as it is not only rich in species but covers three phases of low sea-level. It is worthy of a detailed palaeontological analysis which will be published separately.

⁴ Zeuner, F. E., 'Das Problem der Pluvialzeiten', Geol. Rundschau, 41 (1953), 242-253.

APPENDIX II

GORHAM'S CAVE, GIBRALTAR: REPORT ON THE CLIMATIC EQUIVALENT OF THE MARINE MOLLUSCA

by D. F. W. BADEN-POWELL

The present day distribution of the shells from Gorham's Cave turns out to be interesting, as there are at least two cold Atlantic indicators present.

The distribution is as follows (using Dr. Cox's nomenclature*):

Glycymeris pilosa (Linn.): Mediterranean and southern; ? living north of Straits of Gibraltar in Atlantic.

Pecten maximus (Linn.): Straits of Gibraltar about southern limit; living in Atlantic.

Mytilus galloprovincialis (Lam.): Spain, Mediterranean and Morocco.

C Moliolus modiolus (Linn.): English Channel northwards.

Cardium tuberculatum (Linn.): English Channel southwards to Madeira and Canaries.

Paphia decussata (Linn.): England to Mauretania, perhaps to Senegal.

Patella coerulea (Linn.): mostly Mediterranean.

Patella ferruginea (Gmel.): mainly Mediterranean; ? Senegal.

Monodonta turbinata (Born): Mediterranean; Portugal to Canaries.

Monodonta articulata (Lam.): ? England to Morocco. Difficult to be certain about this owing to doubt whether it is a synonym of *Trochus lineatus* (da Costa).

Littorina littoralis (Linn.): Greenland to Straits of Gibraltar. Fossil but not living in Morocco, south of Gibraltar.

Turritella triplicata (Brocchi): the typical form may be extinct; varieties living in the Mediterranean, Spain and Canaries. Difficulty whether it is a synonym of Turritella incrassata (Sowerby). Cypraea spurca (Linn.): Spain and the Mediterranean with tropical affinities to Brazil and the Gulf of Guinea.

Trivia monacha (da Costa): Norway to the Straits of Gibraltar and Mediterranean.

Thais haemostoma (Linn.): Mediterranean to Tropics. Has been recorded from France (Atlantic coast), but affinities definitely southern.

^{*}C: cold indicator

GORHAM'S CAVE: Table showing the stratigraphical distribution of marine mollusca

Helix (Otala) marmorata Fér	Semicassis undulata (Gmel.) — sulcosa (Brug.)	Charonia lampas (Linn.) — nodifera (Lmk.)	Nucella lapillus (Linn.)	Thais (Stramonita) haemostoma (Linn.)	Trivia monacha (da Costa) — europaea (Mont.)	Cypraea spurca (Linn.)	Littorina littoralis (Linn.)	Turritella triplicata (Brocchi)	Monodonta articulata (Lam.)	Monodonta turbinata (Born.)	Patella coerulea (Linn.)	Patella ferruginea (Gmel.)	Paphia desussata (Linn.)	Cardium tuberculatum (Linn.)	Modiolus modiolus (Linn.)	Mytilus gallo-provincialis (Lam.)	Pecten maximus (Linn.)	Glycymeris pilosa (Linn.)	
1	p	-	1	1	1		- 1	-	1	2	62	1	1	1	1	2	7	-	>
L	1	1	-	2	1	1	-	T	2	w	211	1	-		1	15	0	1	В
1	1	1	1	1	1	1	1	ł	-	1	8	1	1	1	1	w	1	1	0
1	1	1	1	1	3	-	1	1	33	w	228	1	-	1	6	38	26	1	D
1	1	1	1	ı	1	1	1	1	w	1	42	1	1	i	1	=	0	1	D2
L	1	1	1	1	-	. 1	1	1	22	1	26	1	-	ı	i	22	-	1	E1
1	1	ŧ		1	1	1	1	1	7	4	41	1	ı	1	1	12	2	1	E2
1	1	1	1	1	1	1	1	. 1	1	1	30	2	ŧ	1	1	0	9	1	E3
1	1	1	1	ı	1	ł	1	1	1	-	26	1	1	ı	1	65		1	FI
1	1	1	1	ı	1	1	1	1	1	-	19	i	t	1	ł	46	1	t	F2
2	1	1	1	1	1	1	1	1	1	1	33	1	1	1	ı	9	1	. 1	3
_	1	1	1	1	1	1	1	1	=	1	109	1	ı	1	1	32	ı	1	G
1	1	1	1	1	ı	1	1	1 .	1	T	1	1	1	1	1	1	t	ı	Ξ
1	1	1		1	1		1	1	1	1	1	1	ı	1	1	ì	1	1	JI
	1	1	1	1	1	1	1		ì	ı	1			1	1	1	1	1	J2
Ŀ	1	1	t		1	1	1	1		ı	49	6	1	1	1	ω	1	1	7
1	1	1	1		ı			1		1	ı	1	1		1	1	1	1	٢
1	2	-1	1	1	ı		4	I	1	1	45	5	1		l	1		1	Z
	1	1	1		1		1		1	1	1	1	1	1	ı	1	ı	1	O
1	ı	1	-		ı				1	1			1		1	1	1	1	P
1		1	-		1	1	1	1	1	1	2				_	1	_	1	0
1		1		1	ł	1			ı	1	4	l l	1	1	_	2	_	1	R
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1		1	1	1		_	1	1	1	ı	T	-	_		1	1	1	1	S2
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J. d'A. WAECHTER

C Nucella lapillus (Linn.): northern Europe to Portugal; dwarf strong-ribbed variety as far south as Mogador (Morocco). On the whole, a cold indicator as a Gibraltar fossil.
Charonia lampas (Linn.): mainly Mediterranean and from Mauritania to Angola; ? a variety

Charona lampas (Linn.): mainly Mediterranean and from Mauritania to Angola; ? a variety Atlantic coast of France.

Semicassis undulata (Gmel.): Mediterranean and Morocco (African) coast.

The two cold indicators, *Modiolus modiolus* and *Nucella lapillus* are typical of Deperet's cold Atlantic influence at certain stages in the Pleistocene history of the Mediterranean; as shown in his analysis of the Gibraltar raised beaches. Paul Fischer has also published a long list of shells from the Monasterian raised beach on Gibraltar. Fischer stressed that the difference between Atlantic as opposed to Mediterranean influence is as important among the Gibraltar fossils as a straight contrast between warmer and cooler climates, and he thought a certain raised beach fauna (the Monastirian or Last Interglacial) was dominantly Mediterranean, whereas some kitchen midden shells in a cave (Mousterian and also Last Interglacial) were mainly Atlantic. This character applied to one and not to all the Gibraltar Pleistocene beaches. The Atlantic influence seems to be strong in the shell list published here.

Depéret, C., 'Essai de coordination chronologique générale des temps quaterraines', C.R. Acad. Sc. Paris 167 (1918).

² Fischer, P., 'Excavations of a Mousterian Rock-shelter at Devil's Tower, Gibraltar: Fossil Mollusca', *Journ. Anthrop. Inst.* 58 (1928), 111—113.

APPENDIX III

GORHAM'S CAVE, GIBRALTAR: REPORT ON THE CHELONIA by J. B. Delair

As far as can be determined at present, the specimens are nearly all referable to the chelonian genus *Testudo* and very probably to the species Graeca. The fragmentary nature of the fossils renders their true identity a difficult task. Furthermore, the condition of most of the specimens has not helped in the determination of many of them, and in many cases, it has only been possible to assign them tentatively to known chelonian elements. The exact number of individuals represented in this collection is open to question, but there are certainly five, and probably several more.

The presence of *Testudo*, which occurs from Layers G to Q, suggests that the ecological conditions were not markedly different from the present day as this genus still inhabits southern Spain.

Note: With the exception of Layers N and Q, all the specimens came from occupation levels.

THE EXCAVATION OF GORHAM'S CAVE, GIBRALTAR, 1951-1954

APPENDIX IV

GORHAM'S CAVE, GIBRALTAR: REPORT ON THE PLANT REMAINS

by C. R. METCALF

(Royal Botanic Gardens, Kew)

The following plant remains have been identified:

Layer B: Possible fragments of seeds of Pinus pinea.

Layer D: charcoal, almost certainly from the wood of box (Buxus). Charcoal of Pinus, most likely P. pinea.

Layer G: charcoal of Pinus, most likely that of Pinus pinea. Fragments of pine cones, most likely Pinus pinea.

APPENDIX V

by K. P. OAKLEY

The following Carbon 14 determinations were made by the late Dr. H. de Vries of Groningen and a summary of these results has been kindly supplied by Dr. J. C. Vogel.

The first two samples from Layers D and G were collected by Mrs. Topp and myself in July 1957. In view of the importance of the site, a new sample from Layer G was collected in December 1957 and a new sample from Layer G early in 1958. All the samples were sent to Dr. de Vries through the British Museum (Natural History). The dates obtained from the samples are as follows:

GRN-1363	Gorham's Cave, Layer D 27860 ± 300 B.P.
GRN-1455	Gorham's Cave, Layer D
	(New sample) 28700 ± 200
GRN-1556	Gorham's Cave, Layer G 49200 ± 3200
GRN-1473	Gorham's Cave, Layer G
	(New sample) 47700 ± 1500
GRN-1678	Gorham's Cave, Layer G
	'Humus' fraction 47000

The date which I published in Adv. Sci. 1962, c. 49,000 B.P., has now been superseded by the new dates above.

As the Göttweig interstadial appears to have begun around 45,000, the Gibraltar Mousterian is datable as Würm I by the radiocarbon evidence.

J. d'A. WAECHTER

APPENDIX VI

by J. d'A. WAECHTER

The two dates referred to by Dr. Oakley (Appendix V) are of considerable interest since they augment the growing number already obtained from Europe and in addition provide interesting comparisons with those from the south Mediterranean, particularly those for the Levalloiso-Mousterian of North Africa and the Middle East.

These two figures however appear to be at variance with the chronological concept deduced from the geological and pedological evidence. As conceived by Zeuner (Zeuner 1953) and also in the preliminary report (Waechter 1951) both Layers J and E represented periods of high sea level and, since the whole archaeological deposit was post-Monastirian II, were allocated to the Göttweig and Paudorf interstadials respectively. According to the available Carbon 14 evidence neither of the Gibraltar dates would support this conception, the Göttweig being c. 43,000 B.P. as compared with Layer G's 47,700 B.P. and the Paudorf c. 28,500–25,600 B.P. to Layer D's 28,700 B.P. (Movius).

Some doubts have been cast on the validity of the existing dates for the Göttweig interstadial not only on the possibility of contamination but also on geological grounds. There seem to be two possibilities, one that the four dates, Göttweig, Paudorf, Layer G and Layer D are not correct or that there is an error in the interpretation of the Gibraltar section.

In the case of Layer J the pedological evidence strongly suggests a period of high sea level which is independently supported by the presence of the Epi-Monastirian beach, and it would seem to be impossible to put this anywhere other than in the interstadial Würm I-II or Göttweig, unless the Göttweig was in fact represented by the second indicated high sea level of Layer E, a position which neither the nature of the deposit nor the archaeology support.

The same chronological problem presents itself with regard to the date of 28,700 for Layer D with its position on the basis of the geology and pedology as post-Paudorf or Würm III. As in the case of Layer G the date for Layer D is older than those of Paudorf which it is assumed to succeed though not by so large a figure. The date of 28,700 would put Layer D in line with the early Aurignacian of La Quina, Grotte du Renne and Caminade all of which preced the Paudorf (Vogel and Waterbolk). Unfortunately there is insufficient material from Layer D to make a comparison with these French sites, any more than the suggested Magdalenian relationship referred to in the conclusions, though Layer D would not be out of place in an Aurignacian context on the basis of the steep-scrapers alone.

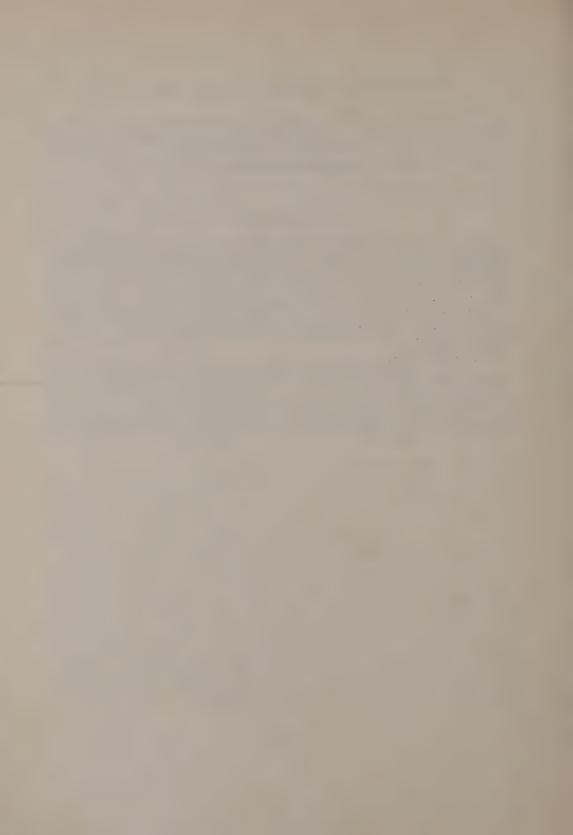
THE EXCAVATION OF GORHAM'S CAVE, GIBRALTAR, 1951-1954

While it seems impossible to reconcile the discrepancies of the two lines of evidence it must be remembered that the dates for the beginning and end of the Göttweig need further amplification and at the same time the last word has not yet been said regarding the geological interpretation of the section.

ACKNOWLEDGMENTS

As in the previous seasons the expedition received much valuable assistance and support from the military and civil authorities in Gibraltar, for which they are very grateful. Our thanks are particularly due to H. E. Lieut-General Sir Gordon McMillan, K.C.B., C.B.E., D.S.O., M.C.; Brigadier G. H. F. Stayner, C.B., C.B.E.; Brigadier G. Lucas, C.B.E.; Colonel W. R. Healing, R.E.; Lieut-Colonel J. Matthews, R.E.M.E.; The Hon. J. D. Bates, Colonial Secretary; The Hon. J. Hayward, O.B.E., Financial Secretary and the Chairman and Curator of the Gibraltar Museum.

The value of this paper has been greatly enhanced by the specialists' reports appended: the mammalian fauna by Prof. F. E. Zeuner and Dr. Sutcliffe; the determination of the shells by Dr. L. R. Cox and their distribution by Dr. D. F. W. Baden-Powell; the Chelonia by Mr. Delair; Dr. Metcalf's identification of the plant remains and Dr. Oakley's note on the C 14 dates from samples collected by Commander and Mrs. Topp.



A Contribution to a New Datum for the Pre-history of the Thames Valley

by S. W. WOOLDRIDGE and I. W. CORNWALL

In the physical history of the London area, a wide hiatus separates even the earliest of the drift deposits from the youngest of the Eocene sediments and it is within this long-lost interval that the pre-historian must seek his starting point. The most enigmatical part of this interval is the record of post-Eocene time prior to the accumulation of the Thames Valley drifts. The important palaeolithic sequence established in these, notably at and near Swanscombe, raises at once the question of the date and order of earlier events concerning which there has been wide difference of opinion. The Thames Valley lying nearer to the ice edge than that of the Somme, being, in fact, pro-glacial rather than peri-glacial in situation, ensures that the problems of Pleistocene chronology and cultural sequence. each in itself complex, are here inextricably mixed. The older literature leaves confusedly unresolved the relations of man and the Ice Age. The implement-bearing drift deposits were not systematically described by the Geological Survey until 1889, and Whitaker's great memoir of that date1 records the long and rather foolish controversy as to whether the deposits were pre- or post-glacial. This very nomenclature itself reveals clearly the continuing dominance of mono-glacial views despite the publication of James Geikie's Great Ice Age 16 years earlier. He, indeed, was clear that the deposits were inter-glacial but the older view died hard and was vehemently upheld by an ill-judged and violently dogmatic insistence on certain palaeontological evidence held to indicate the high antiquity of the High or 100' terraces of the Thames, It was in 1912 that the late S. H. Warren announced his important discovery² of a truly arctic climate in the lower-level deposits of the Lea Valley—'the Ponders End stage.' This was reasonably correlated with the return of land ice in more northerly localities and with the wide-spread evidence of solifluction or trail throughout the south. This plainly evidenced return of the cold seemed to place the higher Thames terraces, with their warm or temperate faunas, securely between an earlier glaciation represented by the chalky boulder clay and this later Arctic phase which must mark true glaciation elsewhere. The superposition of the Boyn Hill terrace upon the boulder clay had been seen and

Whitaker, W., (1889) Geology of London, Vol. 1 (Mem. Geol. Surv.), 353. Warren, S. H., (1912) Quart. Journ. Geol. Soc. 68, 213; also 71 (1916), 164 and 79 (1923), 603.

recorded much earlier at Hornchurch.³ In this relation, recently re-examined by one of us, lay most of the ensuing confusion and doubt in the subject. The monoglacial myth lived on in the assumption that there was only *one* boulder clay in the London area; it was, in fact, habitual to refer as above to 'the boulder clay'. The extreme palaeontological pedants, ignoring the manifest facts of faunal migration under climatic control, insisted in equating this single advance of the ice with the Arctic cold of the low terrace, thus abolishing the intervening interval now estimated as having a probable duration of some 200,000 years.

The recognition of the Arctic Beds of the Lea Valley as probably representing the advance of land-ice elsewhere was the first step in commending a multiglacial view of the Thames Valley sequence, but it was less than fully satisfactory in presupposing the equation of solifluction with glaciation, i.e. of periglacial with glacial conditions. Such equation had become, and still remains, widely fashionable in continental Europe. It has always been less convincing in oceanic Britain. In any case, this left the London area still with only one definite ice invasion and that presumably the first. It is here that we reach the crux of the Thames Valley problem as it has since developed. A first glance at the drift map (e.g. Sheet 16 Geol. Surv. 1/4 inch) certainly suggests that the Chalky Boulder Clay is the best interregional datum horizon. From its dissected edge north of London it extends in a continuous sheet to the East Anglian coast and is recognizable in the Midlands. It is the most extensive and the thickest of the superficial deposits of the London area and simulates a regular stratum in mapping. Nevertheless it has a considerable range of altitude and its base is therefore irregular. Thus, in the Lea Valley, at Wormley and Broxbourne, it adjoins the Taplow Terrace at elevations below 200 feet, while little more than three miles away it caps the high ground at Epping Green at above 400 feet. It evidently represents, not a 'horizon' but an accumulation over a considerable period of time. It is worthy of remark that a similar doubt affects the base of the Boyn Hill Terrace, the only member of the terrace drifts with which it is in contact. The long aggradation following the laying down of the Lower Gravel at Swanscombe implies at least on the margins of the valley that the gravel base differs in age from place to place. In the formal language of the textbook, both the Chalky Boulder Clay and the Boyn Hill Terrace are diachronous and any conclusions based upon a single local contact between them are to this extent liable to be invalidated. To speak thus may seem to imply an unusual and probably unattainable refinement of dating, yet it is unlikely that our problems will ultimately be solved on any less exacting basis.

Granting, however, that the Chalky Boulder Clay may be of somewhat different age in different places, it has seemed that it can rank, in some sense, as a unit,

Bolmes, T.V., (1892) Quart. Journ. Geol. Soc. 48, 365.

notably because it is generally readily recognised in the field. This has for long left it an open question to which major glaciation in the European or General sequence it is to be ascribed. The names of the famous Alpine stages of Penck quickly became familiar and indeed over-fashionable in Britain. In these terms the question for the London geologist or pre-historian was 'Is our (i.e. "the") Boulder Clay, Mindel or Riss? or if a North German correlation was deemed preferable, Elster or Saale? or following a more recent author (F. E. Zeuner) Antepenultimate or Penultimate?' The crux here involved was thus concisely expressed by K. P. Oakley, twenty years ago.⁴

'There could be no doubt that the gravels of the 100-foot terrace of the Lower Thames were later than the Chalky Boulder Clay yet they yielded a fauna that could have no place outside the Great Interglacial or Mindel-Riss period. But the North Sea Drift in Norfolk overlies the fauna of Günz-Mindel age at Cromer and hence qualifies for equivalence with the Mindel, leaving the Chalky Boulder Clay apparently representing the third or Riss glaciation'.

In this judgment one sees the re-emergence of a palaeontological control more soundly based than the former erroneous view that there was a single glaciation marked by a single cold or arctic fauna (=Ponders End stage). Zeuner's recognition⁵ of a phylogenetic lineage in the fossil fallow-deer, *Dama savini*, in the Antepenultimate Interglacial, *D. clactonianus* in the Swanscombe fauna and *D. dama* in the Last Interglacial, has not, to our knowledge been queried or disproved. Independent confirmation of the dating is afforded by the successful correlation of the top of the Boyn Hill aggradation with the 32m sea level of the Great Interglacial.

For our present purpose we accept the Great Interglacial age of the Boyn Hill Terrace as established beyond reasonable doubt and the problem our investigation has sought to elucidate may be simply expressed: 'where in the area, and how, can the presence of a Mindel or Ante-penultimate boulder clay be demonstrated'?

There have, in fact, been several recent attempts to sub-divide the Chalky Boulder Clay. They need not be reviewed in detail here, since they are summarised in a recent paper.⁶ Even if the several sub-divisions proposed are valid they are difficult in application in the London area itself. Standing on the mapped boulder clay in Middlesex or Hertfordshire, there is no ready means of deciding the question 'Is this the Lowestoft or Gipping Till of Baden Powell or the Hanningfield, Maldon or Springfield tills of Clayton?' We prefer here to make another and wider cast and revive the question 'was there not a western as well as an

⁴ Oakley, K. P., (1942) in discussion of A. J. Bull, Proc. Geol. Assoc., 53, 1.

Zeuner, F. E., (1959) The Pleistocene Period, 149.
 Wooldridge, S. W., (1958) Proc. Prehist. Soc. (NS) 23, 1.

eastern ice invasion of the London area?' The history of this question merits brief review.

More than a century ago, Prestwich in a letter to Lyell (July 1859) distinguished the boulder clay from the Western Drift. 'As for these two drifts . . . last year I found the Boulder Clay in a valley near St. Albans with the Western Drift capping the hills flanking this valley and therefore apparently older than the Boulder Clay'.⁷

It seems probable that the valley in question was that at Sandridge (NGR 52/172102) recently re-described by one of us. The reference is ambiguous only in the doubt whether the 'Western Drift' comprised gravels or clays. Prestwich was aware of the great train of gravels with Triassic debris which enters the region at Goring Gap. These are for the most part gravels, but include stony clays.

When, in 1918, the District Geologist for London (George Barrow) gave an interim report⁹ on the results of the Six Inch re-survey of the area, he noted the classification used on the former Old Series maps and remarked: 'This assumes that there is no clay of glacial origin containing far-travelled stones other than the Chalky Boulder Clay, an assumption that is wrong'. Barrow invoked a western ice-sheet entering the district 'through and about the side of Goring Gap'. He stressed particularly the sections seen by him at Chorley Wood Common, and Cowcroft, near Chesham; the former he described as a true englacial boulder clay and at the latter place noted considerable slide or thrust planes disturbing both the deposits and the underlying chalk. Five years later, H. L. Hawkins¹⁰ found further evidence of the intrusion of westerly ice at Coldharbour, high on the Chiltern crest above Goring Gap, where a stiff stony clay yielded, in addition to local debris, Old Red Sandstone conglomerates and rhyolites of probable Welsh provenance. In the same year one of us excavated sections in boulder clay over gravel capping the Epping Forest ridge.11 Barrow regarded the Western and Eastern ice sheets as broadly contemporary but his friend and co-worker, the late J. F. N. Green, repeatedly expressed the view that the Western incursion was far earlier and this seemed consistent with the Epping Forest evidence. The boulder clay, fully decalcified, yielded Bunter quartzites, rhyolites, and large white quartz pebbles which Barrow regarded as particularly characteristic of the Western Drift. Here, as elsewhere in Essex, there appears to be a relic of an older hilltop boulder clay, high above the Chalky Boulder Clay on the adjacent slopes and valley floors.

⁷ Prestwich, J., (1899) Life and Letters of Sir J. Prestwich, 133.

⁸ Wooldridge, S. W., (1953) Proc. Geol. Assoc. 64, 219.

Barrow, G., (1919) Proc. Geol. Assoc. 30, 1.
 Hawkins, H. L., (1923) Proc. Geol. Assoc. 34, 59.

Wills, A. K. and Wooldridge, S. W., (1923) Proc. Geol. Assoc. 34, 248.

The last clue in the gradually converging evidence in favour of an older Western Drift was encountered in a study of the Vale of St. Albans 12 R. I. Sherlock had concluded that the Thames formerly followed this line en route north-eastward to the coast. Re-examination of the area tended to confirm this idea, with the important proviso that any such flow was at a much earlier date and a much higher level than Sherlock supposed, far above the present floor of the Vale. From such a course it seemed to have been diverted by an early advance of ice apparently nourished on the higher Chilterns. This was admittedly indirect evidence, but such diversion evidently required glacial rather than merely periglacial agency. The detailed mode or course of any such diversion are inevitably unknown and the hypothesis may appear unduly speculative. A fact-loving field worker, might not unfairly ask for evidence of an actual boulder clay near the supposed line of the former Thames, which might support the idea of diversion at such a date. The emphasis on the last words may be noted. The idea of a diversion has been in general well received, but there has been a regrettable if natural tendency to invoke the Eastern (Chalky Boulder Clay) drift which, however, lies in the existing Lea Valley: not the former valley. One can only flatly state that such suggestion is complete physiographic nonsense. To the recently acquired evidence of a much earlier drift intruder, we may now turn.

The Hertford Geological sheet (New Series 239) shows about 1-2 miles N.E. of Welwyn a tract of drift at Potters Heath and Mardley Heath, attaining a surface elevation of nearly 400 feet and thus about 150 feet above the main mass of the Eastern Drift in the Vale of St. Albans. Here about thirty years ago, a gravel-pit near the Potters Heath cross-roads (NGR 52/241181) showed up to 8 feet of reddish stony clay resting on gravel. This presented the features of a true boulder clay. Since British workers caught the trick from the neighbouring parts of the continent of explaining, or 'explaining away', such deposits by solifluction, it may be emphasized that here, on a local summit, there is no higher source for a solifluction stream. A large number of experienced observers have been shown this section, including e.g. Mr. I. S. Double, who averred that it would pass in East Anglia for a boulder clay, and Dr. Paul Woldstedt, who agreed 'an old boulder clay'. The deposits have since been extensively worked by Inns & Company south of the nearby road and here new and better sections have come to light. In the last two years the line of the new Stevenage by-pass road has cut right through the critical area. Leaving the Great North Road by the Clock Restaurant north of Welwyn at about 200-220 feet, the new road climbs to 390 feet at Potters Heath where a deep cutting was made. This valuably supplements the discontinuous exposures in the large pit east of the road. Throughout the whole of the exposed ¹² Wooldridge, S. W., (1938) Quart. Journ. Geol. Soc. 94, 627.

ground pockets of boulder clay are locally preserved, in, and stratigraphically above, coarse gravels. Preliminary examination showed that the clay was completely decalcified, giving indeed an acid soil reaction. An early visit with Professor Zeuner evoked the stimulating and, as it proved, prescient comment that the weathering and notably the condition of the iron compounds recalled those of the southern margin of the German drift sheet in Silesia. Later, in 1957, a Geologists' Association party visited the section, collecting examples of fartravelled stones and of the boulder clay, of which a thin section was prepared at the Institute of Archaeology. The latter revealed very thorough and characteristic weathering, resulting in the release of clay minerals and silicic acid, which imply ambient temperatures much higher than those of the present day but likely to have characterized parts at least of the Great or Mindel-Riss Interglacial.

This was evidently so important a conclusion as to warrant further investigation and four samples have been compared, one from Mardley Heath, two from the road cutting at Potters Heath and one from an entirely different area, Blackfan Wood, south of Bayford, where boulder clay overlies Pebble Gravel. Though there are variations between them in colour and sand-content, the weathering that they reveal is definitely of the type associated with the braunlehm soils of Kubiena.¹³ These are a type within the class Plastosols formed from siliceous, not calcareous, material by intense chemical weathering. A typical braunlehm is completely decalcified and rich in silica and ferric oxide. Cracks and channels are lined with ferric hydroxide rendered mobile by the free silicic acid and the ground mass is stained throughout with the same colloids. Such a soil develops in a constantly humid tropical environment.

We may defer the detailed description of the samples to discuss the general bearing of the evidence. As a whole it appears to put the formation of the boulder-clay into the ante-penultimate or Mindel glaciation. One possible source of error may be dealt with at once. The same type of weathering is admittedly found in the Clay-with-Flints which bears the impress of the high Mid-Tertiary temperatures, and such material might evidently be incorporated in a later boulder-clay. We considered this possibility but the consistency of the character in a range of samples from separated sites renders it in our judgment unlikely. In any case, we are sure that the colloidal flow structures in our sections have been formed in situ since the deposition of the material, so that in part at least the stamp of the former climate is on the mass as a whole, where it now lies.

In thus calling in the laboratory to supplement field observation we are admittedly invoking a method, technical, un-familiar and neither readily or quickly applied. It may therefore be emphasized that a general judgment on the age of the Kubiëna, W., (1953) Soils of Europe, 219.

deposits in question can be based on their situation and elevation. The relations here are similar to those of Clayton's Hanningfield Till in Essex,14 which is similarly a high-level occurrence, standing above the main mass of the Chalky Boulder Clay (the Springfield Till) at lower levels. In the altimetric method so implied there is, however, an element of difficulty. We have already seen that the base of the Chalky Boulder Clay is not horizontal. The Geological Survey in South Hertfordshire have mapped as Chalky Boulder Clay a number of isolated masses at hill-top level and it is readily imagined that in some places the ice advancing from the north-east and canalized largely along pre-existing depressions, may have ridden up to greater heights. The Chalky Boulder Clay is mapped as so doing guite close to our Mardley Heath localities, as e.g. Ayot and Burnham Green. The mapping problem is a difficult one since surface decalcification leaves only a brown stony clay visible but the soil auger may, and often does, reveal chalk fragments at quite shallow depths. Depth of decalcification is itself a rough index of age and has been used by Clayton in Essex, though even here, as suggested by Solomon, 15 there is a source of error if a surface loam rests on boulder clay.

In some respects the most significant of our observations is our southern or Bayford sample. The material sampled is not mapped by the Geological Survey but closely adjoins wide tracts assigned to the Chalky Boulder Clay. If our conclusions are valid it therefore seems likely that both the older and the younger boulder clays lie side by side on the plateau. This is consistent with the recent results of A. J. Thomasson¹⁶ of the Soil Survey who distinguishes what he terms 'Pebbly Clay Drift' from the Chalky Boulder Clay, and notes locally in the former red mottling, suggesting long weathering as in our own samples.

We may here note that, though the style and degree of weathering go far to confirm its great age, i.e. pre-Great Interglacial, they throw no light on its direction of provenance; but the far-travelled stones collected at Mardley Heath in 1957 consistently indicate a westerly source, recalling Barrow's views and Hawkins' observations.

Coming now to our conclusions, while they are, we think, important, they do not of themselves yield any neat or complete solution of the Thames Valley problem.

They provide a certain element of verisimilitude to the hypothesis of the diversion of an early Thames by ice of generally westerly provenance. Moreover, if we are to include the Bayford and Epping Forest relics as parts of the same ice-borne sheet, the latter must have crossed the old Thames Valley. Thereafter, the

¹⁴ Clayton, K. M., (1957) Proc. Geol. Assoc. 68, 4.

Loc. cit. footnote 14, 19.

¹⁶ Thomasson, H. J., (1961) Proc. Geol. Assoc. 72, 290.

Vale of St. Albans was excavated to rather more than its present depth and within it there are three Palaeolithic records: at Hertford,¹⁷ including a 'Clactonian' (cf High Lodge) flake; near Bricket Wood,¹⁸ where there have been found edge-flakes as from the manufacture of core-tools as well as one with features of Clactonian or Early Acheulian stone-working technique; finally, near Rickmansworth where in Dewey's words¹⁹ the gravels contain 'an abundance of rolled and also unabraded implements of Chelles and early St. Acheul type'. In the two former cases the implements came from beneath the Chalky Boulder Clay, so, if we may take our older boulder clay as Ante-penultimate (i.e. Mindel/Elster), the implement bearing beds fall within the Great Interglacial like their analogues of the Lower and Middle²³ Thames Valley.* The latter, however, is

¹⁷ Kendall, H. G. O., (1917) Proc. Prehist. Soc. E. Anglia, 2, 352.

¹⁸ Cornwall, I, W., (1948) 4th Ann. Rep. University of London. Institute of Archaeology, 39.

19 Dewey, H., (1926) C. R. Cong. Intern. Géol., 1438.

Loc. cit. footnote 6, 17.

Loc. cit. footnote 5, 155.
Loc. cit. footnote 5, 172.

²³ Wymer, J., (1961) *Proc. Prehist. Soc.* (NS) 27, 1.

*A diagrammatic sketch of the section at the Long Valley Wood pit, Croxley Green, in the geological report by Dewey appended to Reginald Smith's paper,²⁴ shows two distinct series of deposits. The first is 7 feet of ill-sorted gravel, lying on the Chalk bench, containing large boulders of sarsen, Bunter quartzite and other Western Drift rocks—clearly outwash of a glaciation later than that which brought these erratics into our area. From its height of only 200 feet O.D., this could evidently not be the Western Drift Glaciation itself, but the next succeeding, following the cutting of the Vale of St. Albans, perhaps that of the Lower Boulder Clay at Ware.

The second deposit is 4 feet of finer gravel, followed by 7 feet of current-bedded gravel and sand, on which lies a foot or two of mottled clay. This is the classical sequence of an aggrading river, probably under temperate conditions, for, even though the site seems a long way from the control of any present-day sea-level that of the Great Interglacial was 33 m. (100 ft.) higher than it is to-day. Moreover, a climatic (cold) aggradation would not produce increasingly fine sediments.

Owing to the way in which they were collected in the years before 1914, the finds in the various pits, if their position is known at all, are, in most cases, distinguished only by their depths below the surface. Since the gravel strata are substantially horizontal, while the original ground surface was the slope of the valley side, the mere depth does not identify the level of a find unless its position in the horizontal plane is known also.

There are a few exceptions to this, notably a large group of 40 flakes (p. 198) from 'the four feet of gravel immediately over the chalk', specifically compared by Reginald Smith with those from the Lower Gravel at Swanscombe. These at least, and possibly some of the rolled and ice-scratched hand-axes, should antedate the outwash-gravel which contained them.

A considerable number of the finds, however, is of implements which, taken by themselves, would, on typological grounds, unhesitatingly be described as Middle Acheulean—similar to those from the Middle Gravel at Swanscombe. If these are no earlier, as seems likely, than the fluviatile part of the gravel in the section, they would belong to an Interglacial—the Great Interglacial, if the above reasoning is sound.

The Upper series of Rickmansworth finds would then agree, as Reginald Smith himself concluded, with

the Middle Gravel industry at Swanscombe, in their geological age as well as typologically.

If this be accepted, an interesting consequence ensues. The rolled hand-axes and flakes at Rickmansworth must be antecedent to the glaciation (Ante-penultimate II) the meltwater of which yielded the outwash-gravels, unless their makers were living close to the ice-edge while the gravels were forming, which seems unlikely. The Lower Gravel flakes at Swanscombe, however, are in a river-deposit later in formation than the Hornchurch Boulder Clay, which we here attribute to the same ice-advance. Thus, either the Swanscombe artifacts are derived from the outwash of the Hornchurch Boulder Clay ice, or, if in situ (as most seem to be), are later than the Rickmansworth lower series, which are in that outwash. There seems, therefore, to be a good

20 miles away from the nearest occurrence of our older boulder clay and between them lies an area with wide expanses of Chalky Boulder Clay and it is with part of the latter that the Boyn Hill Terrace is supposedly in contact.

We can conclude by suggesting that the clue we have obtained can and should be the starting point of much further investigation designed to enquire where similar deeply weathered boulder clay can be identified further south, i.e. nearer the Lower Thames Valley or elsewhere. Obvious analogies for comparison are Clayton's Hanningfield Till and the Norwich Brick Earth. It is, however, fairly certain that the Hornchurch Boulder Clay does not show such weathering, but its surface is eroded: i.e. the original weathered surface has been removed. It remains possible, therefore, that as concluded in a former paper, our old boulder clay is Ante-penultimate I and the Hornchurch boulder clay Ante-penultimate II. This latter is Zeuner's conclusion on other grounds.

But while this ordering of events is happily consonant with the palaeontological evidence it has physiographic implications not formerly fully realized, since it implies the pre-existence of *the* or *a* Lower Thames Valley. Evidently, if an early ice-sheet swept right across the district, it can readily have descended into the valley of the Thames and its tributaries, deepened following the concurrent eustatic depression of sea-level.

Here we are happy to concur with the views of our colleague, Professor Zeuner, to whom we owe so much of our knowledge and inspiration in this field. He writes 'the Boyn Hill bench is overlain by true boulder clay at Hornchurch at slightly under 80 feet O.D. It is therefore older than the Thames Valley glaciation but it appears to have been cut immediately prior to the arrival of the ice, since the boulder clay lies directly on the bench'21 and he adds later 'The Ante-penultimate Glaciation comprises two phases, the second of which reached the Thames Valley.'22 If so, however, we have not yet distinguished the equivalents of this second phase in the country to the north though the lower leaf of the Chalky

possibility that the flakes, and perhaps also the earlier Acheulean hand-axes of Rickmansworth, were made in the Ante-penultimate Glaciation I-II Interstadial.

The Inter-Boyn Hill stage of downcutting, following the Lower Gravel and Loam at Swanscombe, is not clearly represented at the Long Valley Road pit. There may, however, be a disconformity at the summit of the outwash-gravel and, indeed, there is evidence of some severe erosion at about this time, in the Mill End pit, about two miles downstream, where the level of the Chalk bench, recorded by Reginald Smith, is nearly 30 feet lower than at Long Valley Wood, though the gravels there have yielded a similar assemblage of flakes and Early and Middle Acheulean hand-axes.

The implementiferous gravels at Long Valley Wood are followed, in Dewey's section, by a festooned stony clay. These structures can only be due to brodel-action on a frozen sub-soil during a subsequent glacial period—perhaps that which brought the Eastern (Chalky Boulder Clay) ice (Penultimate Glaciation), at the extremity of its Aldenham Lobe, to a point near Bricket Wood, higher up the Colne Valley, where it overrode the gravels containing worked flakes.

³⁴ Smith, R. A., (1915) Archaeologia, 66, 195.

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Boulder Clay in the Vale of St. Albans, yielding Scandinavian erratics at Ware, ²⁵ may well be of this age. This would mean that the excavation of the Vale of St. Albans was intra-Mindel and part of that of the Lower Thames Valley, of the same date. It would imply also a pre-cursor of the Lower Thames—what some have called the 'Nore River,' ready to receive the diverted waters of the more northerly trunk when the second glacial diversion occurred.

We feel that the evidence we have presented goes some way to suggest convergence between views formerly at variance. It is in any case evident that it is indefensible and misleading to speak of *the* Chalky Boulder Clay glaciation, ignoring its evidently composite character.

²⁵ Sherlock, Pocock and others (1924) Mem. Geol. Survey, 47.

DESCRIPTION OF SAMPLES (PLATE XIV)

Mardley Heath. Porous, heavy, reddish-yellow (7.5YR 6/6) loam, full of root-holes and shrinkage-cracks, along which it breaks into hard, angular fragments when dry. These natural fracture-surfaces are visibly coated with redder (5YR 6/6) waxy colloids.

In thin section, the fabric is dense, save for the above holes and fissures.

Minerals are overwhelmingly quartz—a group of larger size, some well-rounded, 0.4—0.2 mm., but the vast majority smaller than 0.1 mm. down to silt-grades. A few rounded quartzites, up to 0.3 mm. and flint chips.

The iron/clay colloids are concentrated in and around holes and other conducting channels, but, under higher power can be seen to coat and cement the individual grains throughout the fabric.

The soil is a Braunlehm with Parabraunerde features still prominent.

Blackfan Wood (collected from the upturned roots of a fallen tree). A strong brown loam (7.5YR 5/7), slightly deeper in colour than the above. The root-holes and cracks are similar, but the latter are more numerous, indicating greater shrinkage on drying and a generally finer grade of material. All surfaces of fissures are, even to the naked eye and hand-lens, coated with yellow colloids. The coarser quartzes are larger than above, many of them rounded. Flints and quartzites fewer. Most of the quartzes are of the silt grade, smaller than 0.06 mm., and not so numerous, owing to the presence of much more finer material, in the clay-grades. The whole fabric is permeated with iron/clay colloids, without any special concentration round conducting channels. Braunlehm, quite typical.

Potters Heath (two samples from the cutting of the new Stevenage By-pass).

(1) A mottled clayey loam: yellow-red (5YR 5/8) and light brown (7.5YR 6/4). The second (paler colour) is secondary and follows the courses of root-holes, where it seems to be due to modern humic reduction of the colloids, under anaerobic conditions. Under the microscope, the colloid appearance is unchanged, only the colour being locally much paler. In the thin section the larger, often rounded, quartzes are present, as before, but the quartz grains are, on the whole, fewer and less well sorted below 0.1 mm. This is a braunlehm tending to rotlehm (reddish colour) with zones of secondary reduction of the iron-compounds.

(2) Loamy sand. Massive, less shrinkage on drying. The colour is reddish yellow (7.5YR 6/8) with local pale mottling, not as extensive as in the above, yellow (10YR 8/6). The sample is much coarser in grade with rounded ovoid quartzes up to 1.2 x 0.5 mm. Sandier, more porous, less well sorted sand-grains, much less clay. It has stratified deposits of colloid iron in some parts, occupying holes and fissures, but the colloids also envelop and cement the individual grains. Braunlehm, but

appears to be in some part disturbed and probably colluvial rather than in situ.

Soils and Shorelines as Aids to Chronology

by F. E. ZEUNER

INTRODUCTION

Environmental Archaeology is concerned not only with the components of the environment of man in the past, i.e. the substratum, flora, fauna and raw materials, but with the general inferences to be drawn from such material, obtained from the direct study of sites, regarding climatic conditions and chronology. Since changing climatic conditions leave their traces both in geomorphology and in stratigraphy and since both have to be studied by the various methods developed by Quaternary geological research, the importance of this branch of the earth sciences to the study of early man is clear. It should also be remembered that 'Quaternary' includes the entire Postglacial period up to the present day, and not only the 'Ice Age' as is commonly thought.

One of the most serious problems of the chronology of man is long-distance correlation. It is most desirable to be able to apply to any one set of sites more than one chronological method, instead of believing in the infallibility of the method in fashion at the time. The most promising approach to long-distance correlation is that using the fluctuations of the sea-level, both in the Pleistocene for the Palaeolithic, and in the Holocene for later archaeological periods.

The present contribution deals mainly with the Pleistocene aspect of this problem. It is the substance of an address which the writer was invited to give at the Symposium on Geochronology and Land Surfaces in relation to Soils in Australasia, held under the auspices of the Australian Academy of Sciences in December 1961 at Adelaide.

THE IMPORTANCE OF SHORELINE CHRONOLOGY

In recent years much attention has been paid to the climatic changes that occurred during the Pleistocene and the Holocene periods. In part this interest has been stimulated by the fact that man has been present for the last million years or so, leaving evidence of his activities in the shape of prehistoric tools and food debris. Much palaeoecological information about man's reaction to his environment, and indeed to changes in his environment, can be obtained from Quaternary research. But there is another (and from present-day man's point of view more important) aspect of such work: it is making possible the study of the rates of

changes in the environment. How many years does it take for the climate of a particular area to change from humid to arid, for instance, and what was the magnitude of the change itself? It is in studies of this kind that soil science, geomorphology and geochronology meet, and often become so closely interwoven that it is useless to try to draw sharp lines of distinction between these disciplines. Quaternary Research is essentially a unit. This fact was formally recognised when the International Association for the Study of the Quaternary (INQUA), with its various national branches, was founded in 1928.

The position of Australia is difficult because of her geographical isolation. On the other hand, much evidence for climatic changes has been forthcoming, but dating is encountering difficulties beyond about 20,000 years ago—the point at which radiocarbon ceases to be reliable. The Pleistocene is, however, covered by the sea-level chronology, which relies on the basic fact that the sea-level was at all times and is (apart from minute and negligible deviations) horizontal. If, therefore, evidence is found on the coasts of the Mediterranean and the adjacent Atlantic that at one time in the Pleistocene the mean sea-level was at + 32 m., then the same must apply at the same time to the coasts of Australia. The sequence of high shorelines of the Pleistocene thus provides an excellent means of chronological correlation; it is summarized, with a few examples of the evidence, in Table I.

How can such comparatively precise information be obtained? At the outset it is clear that areas where tectonic movements have taken place have to be excluded. Where slight movements, especially tilts, have occurred, these are often revealed in the course of the work only. Moreover, since erosion and denudation have in many places destroyed the evidence for the ancient shoreline, a very restricted number of localities is left which repays investigation. Fortunately, the same conditions have often had a beneficial effect in successive periods in suitable localities, so that some coasts afford good evidence, others poor evidence or none.

For long-distance correlation it is necessary to determine the ancient mean sea-level as exactly as possible. Shoreline features, however, are mainly formed at or near high-water mark, and mean sea-level has to be obtained by deducting half the tidal amplitude.

Since there are several types of coast lines, the methods used may be condensed as follows:—

For the determination of the exact height of a maximum transgression not every shore element is equally useful. In order to eliminate the effect of local tides a value for mean sea-level must be obtained. This is often possible if the following points are observed.

- (a) Erosional or cliff coast lines
 - (1) A platform of abrasion (surf-cut or wave-cut bench), with or without deposits, is insufficient. It provides a minimum value only.
 - (2) The platform rises to high-water mark or a little higher, where it abuts against a cliff. The cliff-platform junction, therefore, provides an approximate value for high-water mark (HWM).
 - (3) At the cliff-platform junction, an undercut or notch is frequently carved out, which provides the best means for determining HWM. In tideless seas, the maximum concavity indicates mean sea-level. Where a notch is absent, the value for the cliff-platform junction has to be substituted, though it is less exact. In some areas with heavy surf, platforms may rise above HWM; for details see Cotton, 1952.
 - (4) The approximate mean sea-level can be obtained by deducting half the local tidal amplitude from HWM obtained. Though the tidal amplitude may not have been the same in the past, the value thus calculated will be nearer the correct level than one to which no such correction has been applied.
 - (5) Alternatively, it is often possible to measure from the ancient notch down to the modern notch. No knowledge of the local tidal amplitude is then required.
 - (6) Where notches are not available, lines of holes produced by rock-boring organisms sometimes indicate approximate HWM.
 - (7) Where the modern notch is absent, the presence of a black lichen zone, immediately above HWM, can often be used as a substitute when the height of ancient shore elements above modern sea-level is to be determined.
 - (8) Storm-beach deposits lie above HWM, sometimes several metres above. Where fossil storm-beach sediments (with their marine fauna!) are used, they result in shoreline estimates that are too high. Coastal dune deposits are also in this category. In certain cases, however, a combination of such measurement with one for the highest point of the abrasion platform yields a good approximation.
 - (9) Sediments on platforms of abrasion are contemporary with the maximum shoreline only at HWM. Below this, and this applies to most platforms, they were deposited as a succession of storm-beaches or other sediments during the regression that followed. Active platforms carry few or no deposits. The most frequently preserved shoreline feature—a remnant of platform with marine deposits—is, therefore, too low and unreliable.
- (10) In narrow inlets, fissures and sea-caves, conditions require careful local investigation. The surge of the water makes the ordinary notch rise above the normal value, and a second notch is often formed by shingle being moved on the floor *under* water.

- (b) Constructional or bar-cum-lagoon coast lines
- (11) Constructional coast lines are found in bays with bars, and lagoons give reliable values only where the lagoon has been filled in up to water level. This is indicated by the transition from aquatic to terrestrial sediments. The height obtained is again HWM, and the necessary adjustments have to be made to obtain mean sea-level.
- (12) Where the bar is gradually being pushed into the lagoon, lagoon sediments appear occasionally beneath the bar on the seaward side. If covered by storm-beach or dune deposits, they may supply approximate values, though it would have to be established whether the lagoon had been filled in completely before the bar was pushed over it.
- (13) According to the traditional view, coastal bars alone do not provide good evidence since they may have formed below or above water-level. Under certain favourable conditions, however, this is possible, as shown by W. Armstrong Price, 1956.
- (c) Estuarine terraces
- (14) Estuaries are often flanked by horizontal aggradation terraces which are adjusted to HWM. Their surfaces, corresponding to the marsh plain, can usually be measured and provide fairly reliable values. It must, however, be kept in mind that they have frequently suffered from erosion.
- (15) Conditions at the mouths of rivers are also liable to depend on the climate. Whilst estuarine terraces of the type mentioned in (14) can be used, remnants of deltaic terraces are very difficult to evaluate, especially in dry climates where their gradients remain steep down to the original coast line which, however, is but rarely preserved. I observed such deltaic terraces, for instance, on the Aqaba branch of the Red Sea (Zeuner, 1957, p.29). They characterize an arid climate.

Observation of the points here listed inevitably eliminates a number of localities, and frequently such as have provided important fauna. Experience has shown, however, that in this manner values are obtained for ancient shorelines that agree very closely in distant localities, occasionally within 30 cm. The margin of error is usually considerably greater, ± 1 m. being acceptable. Where the notches are very wide, difficulties arise. In order to enable other workers to assess the evidence, it is recommended that the shoreline element used in the determination of mean sea-level should always be stated precisely.

The measurements in the field have to be carried out by direct surveying with an Abney level or a similar instrument, ranging poles and tapes, using as zero points either bench marks obtainable from maps, or a modern shoreline feature. Where several measurements are available, the accuracy can be increased greatly.

SOILS AND SHORELINES AS AIDS TO CHRONOLOGY

Wherever geomorphological work on coast lines is carried out, it is essential to ascertain from other geological evidence whether tectonic movements are likely to have occurred. On the other hand, a series of mean sea-level determinations, especially where the points are situated in a way that they provide a system of triangles, is likely to reveal tectonic displacements. Clearly, beach elements which have not been assessed critically are apt to produce misinterpretations. A notch in one place cannot be correlated with a platform remnant elsewhere. Platform elements in ancient bays are particularly misleading. It is also essential not to assume that shoreline deposits containing similar faunas are necessarily of the same age. The evidence so far obtained suggests that there were more oscillations of the sea-level than faunal changes during the Pleistocene (see Table I).

Altimetric	Palaeonto- logical	Strati- graphical Divisions	South France (Depérct)	Morocco (Choubert, Ruhlmann, Gigout, Zeuner)	Gibraltar (Zeuner)	Portugal (Breuil, Zbys- zewski)	North France (De Lamothe, Zeuner)	Devon (Green, Zeuner)	World Average	Prehistoric Industries
					210			300 276 240 207		Pre- Abbevillian Industries
Calabrian	Calabrian		180		180			180	180	and Pseudo-
		Villa-				150-160		159		- Industries
		franchian				125-130		151 129		
						100-105	103	105		
Sicilian			90-100	100	99	90-100			100	
	Sicilian					80-90		67.5		
Milazzian		Ante- penultimate Interglacial	55-60	55-60	62	60	56–59	c.60	59-1	Abbevillian
Tyrrhenian	Tyrrhenian I	Great Interglacial	28-32	25–30	33	30	32-33		?40 32	Acheulian Clactonian
Main Monastirian	Tyrrhenian	Last	. 18-20	15–20	15	6–15	18-19	19.5	17-7	Late Acheulian Micoquian
Late Monastirian	П	Interglacial	7.8	5.8	8.5		8	7.6	7.4	Levalloisian Mousterian
Epi- Monastirian		First Interstadial of Last Glaciation		2	5			3.4	3.4	Mousterian oncoming Upper Palaeolithic

TABLE I Sea-levels as determined by measurement in various parts of the world.

Arab's Gulf, Northern Egypt

The most important requirement, then, is the determination of the ancient mean sea-level as well as this can be achieved.¹

The first example to be given is Arab's Gulf, west of Alexandria, Northern Egypt—an area comparable in many respects with the extreme south-east of South Australia, south of the mouth of the Murray. Both areas have series of ancient bar-cum-lagoon features extending over more than 100 miles. Both have the

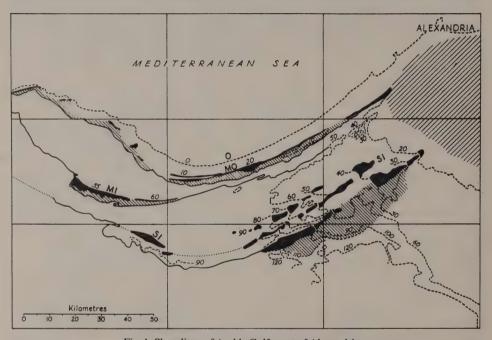


Fig. 1. Shorelines of Arab's Gulf, west of Alexandria.

O = present-day shoreline. MO = Monastirian. MI = Milazzian. SI = Sicilian stages A-C. One stage has been omitted for the sake of clarity. The young bars, especially the Monastirian, are preserved virtually intact, but note the effect of erosion on the Sicilian group, proceeding from the Delta. The Tyrrhenian is found only at the eastern end of the main Monastirian below the Milazzian cliff. This restriction suggests a long duration of the phase, during which the bar was driven inland in all places except near the delta of the Nile.

And, incidentally, state in the publication which beach elements have been used. In this respect very few papers fulfil the basic requirements; only if these elements are stated is comparison possible. 'Twenty-five foot terraces' are, for instance, often unhesitatingly correlated. Tindale (1947), one of the few authors who state how the figures were arrived at, used low-water mark as his zero, but measured to the upper edge of the beach sediment as the fossil feature, which is near, or even somewhat higher than, HWM. To obtain a value comparable with other parts of the world, mean sea-level has to be obtained by deducting from 25 ft. one half of the tidal amplitude to raise LWM to modern sea-level, and one half of the tidal amplitude to reduce the fossil beach from HWM to its mean sea-level. Clearly, the result is bound to be substantially less than 25 ft., and the important Woakwine Terrace of South Australia is, therefore, likely to be of Epimonastirian rather than Late Monastirian age.

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mouth of a large river at their left flank (as seen from the sea). Both have a semi-arid or arid hinterland. In both, the question of tectonic tilts has to be considered.

Arab's Gulf (Zeuner, 1952, 1959, 1962) lies on the south shore of the Mediterranean, with El Alamein at its central point. The fossil lagoons of all ages are less completely filled towards the Nile delta on the east, another feature matched at least by the Coorong Lagoon in South Australia, if not some of the older series. The belt of fossil beach bars and lagoon floors is excellently preserved in Arab's Gulf (Fig. 1); because of the intensely arid climate there was no drainage during the interpluvial phases. During the pluvials, however, retrogressive erosion cut its way into the lagoons from the Nile delta (which was then adjusted to a low sea-level) and in so doing lowered to a varying extent the eastern ends of the ridges. Farther west there is some interference by wind erosion and dune formation, but these can be recognised. Only level areas of lagoon filling have been used for the identification of ancient HWM, and the altitudes obtained are remarkably constant over distances of many miles, so that there is no evidence of tectonic movement. What looks like an eastward dip of the ridges near the delta is the result of erosion, since successively older geological strata are exposed in them.

The following table summarises the evidence, giving locations and altitudes. All, except the Harbour Island bar (which is a storm-beach) are based on lagoon fillings in localities without erosion or aeolian deposits.

LOCALITY	DETERMINED MEAN SEA LEVEL
Harbour Island Bar.	(Near present sea-level).
Depressions S. of Gebel Abu Sir Ridge 1km. S.E. of El Alamein Station and 2km. S.W. of El Alamein Station.	8m. 7m.
Maryut, 3km. S.E. of El Qusaba el Gharbiya.	18m. – 19m.
Oulad Kharuf, 2 km. S. of Bir el Khassa. Depression 14 km. long.	Average 17.5m. (25 points between 16 and 20m.).
Amiriya depression behind Sanaqra-Habbub ridge.	Average 35m. (slightly hilly lagoon floor between 30 and 40m.)
Depression behind Ruweisat Ridge, 3km. S.E. of Ruweisat to 3km. S. of Deir el Abyad.	57m58m.
Wadi el Giwiy, Alam el Osmalli, S. of Gebel Bein Gabir ridge, 12km. S.W. of El Imayid Station.	Cistern at 78m., widespread 80m. level.
Wadi Abu Mina, S. of Alam el Halfa ridge, 15km. S. of Shammama Halt.	Between 80-100m. Lagoon floor too eroded for precise measure- ments, but phase separate from both preceding and following.

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LOCALITY	DETERMINED MEAN SEA LEVEL
Bir Rutan depression, S. of Mikheirta ridge, 22km. S. of El Hammam Station.	85+ m.
Tallet el Tibin depression, S. of Raqabit el Halif ridge, S. of El Alamein.	90+ m.
N.E. corner of Sheet 84/42 of 1:100,000 Egypt normal series map.	103m. (mean of 15 spot levels between 93 and 107m. eight of them 104-105m.).

A comparison of the sequence of sea-levels obtained in Arab's Gulf with Table I shows that close agreement exists with other parts of the world.

South Australia

Among the several workers who have occupied themselves with the ancient shorelines of the South-east Province of South Australia, N. Tindale (1933, 1947, 1958) and R. C. Sprigg (1952 a, b) are the most outstanding. Their work has shown that the sequence of south-eastern beaches is as complicated as the sequences observed elsewhere, and that it could be correlated with them. Whilst in Arab's Gulf, however, war mapping has supplied a large number of bench marks and spot levels, Tindale (1958, 120) rightly pointed out the weakness of the Australian area, which is the scarcity of bench marks. With all the work already done in the area, it should be a comparatively easy, though laborious, matter to establish the heights of lagoon floors between the ridges in the South-east Province, using a carefully planned system of simplified surveying. Any effects of erosion and/or tilting could thus be established.

Lebanon

Let us now turn to an example of erosional coast features, and in particular one that appears to suggest tectonic rise of the land, the shorelines of the coast of Lebanon at the Adlun Caves.

The opportunity to investigate this sequence in detail (Zeuner, 1961) arose when Professor Garrod was excavating the Palaeolithic site of Abri Zumoffen (Garrod, 1961). This abri lies at the base of a vertical limestone cliff, which nearby contains a cave called Mugharat el Bezez. In all, four shorelines could be identified, the lowest being an Epimonastirian level at 4.5m., the next higher (Late Monastirian) at about 10m. (at the foot of the Zumoffen cliff), one (Main

Monastirian) at 20m. (in the cave) and one (Tyrrhenian) at 33m. (on top of the cliff). The detailed record is as follows:

DESCRIPTION	ELEMENT STUDIED	HEIGHT	COMMENTS
Canal on top of cliff	Cemented breccia with rolled pebbles	33.17m.	Possibly too low since no notch preserved
El Bezez. Higher notch in cave	Middle of notch	20.2m.	
Abri Zumoffen. Beach materal at bottom of Trench C	Cliff/platform junction	10.9m.	Possibly too high as in situ rock not clearly identifiable
Byzantine Quarries on Coastal flat	Cliff/platform junction	4.5m.	

If these figures are compared with figures obtained elsewhere, it becomes apparent that they tend to be too high. The mean value for the Epimonastirian is 3.4m., so that the value at Adlun is 1.1m. higher than normal. This small difference would have to be regarded as insignificant if the other beaches, too, were not higher than normal. The Late Monastirian Abri Zumoffen beach is 3.5m. higher than the world average of 7.4m., though there is a possibility here of cemented rock fall being measured instead of the solid platform. The Main Monastirian level from the Bezez cave at 20.2m. is 2.2m. higher than one would expect. The highest figure, for the Tyrrhenian level, also is higher than world average, but since the beach element is here uncertain, we can say only that it is at least 1m. higher than the average.

The impression one gains is that all these localities are slightly higher than the world average, and this is confirmed by at least one other measurement for the Late Monastirian shoreline of Lebanon, at Ras Lados, where a cliff/platform junction is found at 8.1m. Small though these differences are, their consistency suggests that there is some tectonic uplift along the Lebanese coast, which has reached the amount of approximately 2m. since the Last Interglacial. Such uplift was indeed postulated by other workers (e.g. Vaumas, 1947), though Garrod (1962) was apparently not aware of this. Her attempt to date the prehistoric industries by means of the fossil shorelines (l.c. p.237) is praiseworthy, but unfortunately the crucial question of the beach element used in the determination of these shorelines is not even mentioned, and the 4.5m. shoreline is left out, although both Wetzel and Haller, and the present writer, have found it.² Naturally the sequence

² In addition, it has since been discovered by V. B. Proudfoot at Antalya in neighbouring Turkey (1963).

can thus be simplified and ages reduced. Zeuner (1961, 52) explains in detail the relation between the estimated platform levels of Wetzel and Haller (1944), which are all lower than mean sea-level as usual,³ and the maximum mean sea-level itself. Whilst the sea-level chronology at Adlun does not support a late age of the industries, as postulated by Garrod, it does present us with a problem for, if the present writer's interpretation is correct, a blade industry, the Amudian of Garrod, would indeed have appeared in the Last Interglacial for the first time, later to be followed by, and to be mixed with the Yabrudian, a Lower Palaeolithic industry. In view of the fact that *Homo sapiens* is generally believed to have been the bearer of the Upper Palaeolithic blade industries, the mixture of *sapiens* and *neanderthalensis* types in the Carmel caves (whatever its ultimate explanation) affords a parallel to the mixture of the corresponding industrial elements both at Mount Carmel and at Adlun.

Keeping in mind that one must not date industries by means of beaches on one occasion, and beaches by means of industries on the next, a further study of the Monastirian beaches of the Levant and of their super-imposed talus deposits continues to be promising, since here there is an abundance of evidence for the presence of man. Over-simplification of the sequence of geological phases such as practised by Garrod will, however, not help the progress of our understanding.

South Coast of Britain

The mean values for the four lowest high sea-level phases are best illustrated by observations made on the south coast of Britain. The following values will illustrate this point:

LOCALITY	ELEMENT STUDIED	HEIGHT
Plymouth Hoe, Devon	Cliff/platform junction	3.75m.
Matchcombe Bay, Devon	Notch	3.6m.
Lannacombe Bay, Devon	Cliff/platform junction	3.3m.
Sharkham Point, Devon	Cliff/platform junction	3.9m.
Average for above localities		3.6m.
World average for Epimonastirian phase		3.4m.

It should be noted that the figures here given are the result of accurate measuring, whilst the values given for the Lebanese shore terraces by Wetzel and Haller (1944) and Vaumas (1947) were estimated heights of platforms, which are inevitably lower than the high water mark feature now used.

LOCALITY	ELEMENT STUDIED	HEIGHT
Hall Sands, Devon	Cliff/platform junction	8.1m.
Sharkham Point, Devon	Cliff/platform junction	7.2m. +
Hope's Nose, Devon	Cliff/platform junction with marine deposits	7.5m.
Matchcombe Bay, Devon	Cliff/platform junction	7.5m.
Black Rock, Brighton, Sx.	Notch	7.5m.
Average for above localities		7.6m.
Average for world for Late Monastirian phase		7.4m.
Mousehole, nr. Penzance, Cornwall	Cliff/platform junction with deposits	19.5m.
Portland Peninsula, Dorset	Platform rising to cliff	16.5m.
Average of above localities		18.0m.
World average for Main Monastirian phase		17.5m.
Penfold's Pit, Slindon, Hants. (Perhaps storm beach and therefore too high; containing Middle Acheulian in situ.)	Beach sand nr. cliff	33.5m.
World average for Tyrrhenian phase		32.0m.

In spite of a certain amount of local variation due to the particular shoreline feature used, these values are so close to the world averages that tectonic movements are unlikely to have taken place in this area.

The examples given are intended to show how numbers of individual measurements quickly produce averages reasonably close to the figures obtained for the ocean as a whole, and where tectonic movements are suspected, these will become apparent.

The River Thames

Finally, let me quote an example of estuarine deposits providing evidence for the height of the sea level. In the estuary of the Thames four levels of aggradation can be recognised: at about 3m. (Lower Flood Plain Terrace); at 7.5m. (Upper Flood Plain Terrace); at 16.5m. (Taplow Terrace); and at 32.0m. (Swanscombe Terrace) (Zeuner, 1959).

At Swanscombe, the river gravels rest on a bench at 75 ft. O.D., formed during the preceding glacial phase, which on the northern side of the valley carries the boulder clay of the Antepenultimate Glaciation. From this level, three sequences of aggradation raised the height of the surface to 107 ft. or a little less; estuarine silts and sands were then deposited up to 110 ft. O.D. (33m.). This was the height of the marshes (and of HWM) of the Great Interglacial. Solifluction deposits accumulated in one or more later cold phases on top of the surface, finally raising it to 115 ft. O.D.

Australia

The importance of the work on ancient shorelines thus lies primarily in the inherent possibility of correlating over great distances and even across the oceans. I feel confident that Australia will eventually be linked with other continents by this means. Apart from the south-east coast of South Australia, the stable block of West Australia should afford excellent opportunities. That ancient shoreline features are present there has been shown by Teichert (1946, 1950) and Fairbridge (1961a). These authors have paid particular attention to the sea-level fluctuations of the Postglacial, a matter of considerable interest since the sea-level exceeded its present height more than once in the last 7,000 years. Much of this evidence has recently been brought together and elaborated by means of radiocarbon dates by Fairbridge (1961b), and there is evidence that these fluctuations have left traces on Kangaroo Island.

Recent work on absolute dating, using astronomical methods, deep-sea cores, oxygen isotope ratios, and protactinium/thorium dating, is beginning to provide a time-scale for the system of ancient shorelines recognised. It is evident, therefore, that if events in any one area can be related to sea-level fluctuations of this kind, both correlation with other areas and absolute dating become possible, and with it the dating of prehistoric sites on beaches or river terraces.

The interiors of semi-arid regions provide a characteristic type of evidence for climatic fluctuations in the shape of lake levels. In areas where prehistoric man was present in abundance, his implements provide very valuable index fossils, in addition to the ordinary fauna. An example may here be quoted from the desert of Transjordan which, I believe, is comparable in several respects to the dry lake basins of the interior of Australia.

Northern Arabia

In the north Arabian region just mentioned many undrained depressions are encountered which appear to have formed with the help of wind erosion. The Jafr depression (Zeuner, 1956), for instance, cannot be older than the Pleistocene since

it lies in sandy gravels of the pebble-desert-plateau, which contain an Abbevillian industry and were deposited under relatively humid conditions. The gradual erosion of this depression took place during dry phases, whilst during humid phases shallow lakes established themselves, an alternation which has produced shore terraces that are preserved in many places. The sequence of events in the Jafr depression may be summarised as follows:—

EVENT	CLIMATE	PREHISTORIC INDUSTRY
Gravels of the plateau surface	Humid	Abbevillian
Formation of desert pavement	Arid	No industry
Hiatus	Unknown	Clactonian
Erosion of + 10m. shore terrace	Humid	No industry
Occupation of ancient lake shore	? drier	Upper Palaeolithic VI
Erosion of + 5m. shore terrace	Humid	No industry
Wind erosion to present level or lower	Arid	No industry
Establishment of present qa filling	Humid	No industry
More wind erosion	Drier	Mesolithic and Neolithic

This sequence is one of many (and I am sure that they exist in numbers in Australia, too) that could be used to illustrate the point that climatic fluctuations have left complicated records in dry areas. Naturally lake basins do not occur everywhere, and in less arid zones particularly, fossil soils provide additional information. In the transitional zone they are of paramount importance since the alternation of soil formation in humid conditions and deposition of aeolian sediments with arid conditions has provided, in suitable places, long sequences of climatic events. Two examples, one from temperate Europe and one from India, must suffice to illustrate this point, which is bound to play a most important part in the elucidation of the climatic history of Australia.

Czechoslovakia

The temperate zone of central and eastern Europe, where it has not experienced glaciation, is characterised by a sequence of Pleistocene deposits in which loess, i.e. aeolian dust, plays a considerable part. The present humid-temperate climate, as well as earlier phases of such climate, are represented by soils which vary from podsol to braunerde and chernozem, according to local conditions and the climate at the time. Cold and dry phases, on the other hand,

are represented by deposits of loess. Sequences of loesses and buried soils, therefore, represent the fluctuations of the Pleistocene climate (Zeuner, 1955). The most complete sequences are observed in eastern central Europe, particularly in Czechoslovakia (Fig. 2). The sequence from Sedlec, near Prague, contains eight loesses separated by seven fossil soils and it rests on a series of river terraces, by means of which the age of the loesses has been determined (Zaruba, 1942). Loess-like deposits are by no means uncommon on the borders of warm deserts; I have studied them in Tunisia and Jordan, on the northern margin of the Sahara and on the southern edge of the Indian desert in Gujarat.

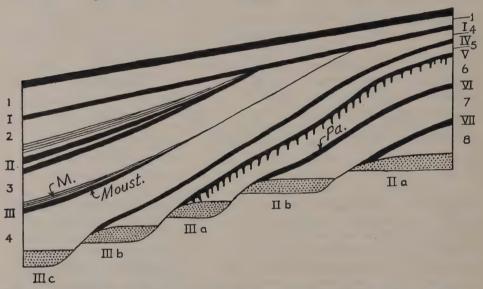


Fig. 2. Sequences of loesses and buried soils on the terraces of the Vltava (Moldau) river at Sedlec, near Prague, Czechoslovakia. After Záruba, Prosek and Lozek. Eight loesses are present, separated by seven fossil soils.

Gujarat, India

Gujarat provides another interesting area where fossil soils alternate with wind-blown deposits (Zeuner, 1950, 1963: Fig. 3). There, of course, the soils belong to the rotlehm group; and the country is at present passing through a dry phase with a considerable amount of wind activity. This kind of evidence for humid and dry fluctuations of the climate is to be found in all semi-arid countries, and their study is the most readily available way into the palaeoclimatology of the Pleistocene

The combination of such evidence with the fluctuations of the sea-level is, however, not easy to achieve. It is unfortunate that in many parts of the world a tectonically active mountain range separates the dry area from the coast, as, for instance, in eastern Australia and in Syria. It is necessary, therefore, to look for specially favourable conditions. These may be afforded by a large river system coming from the semi-arid zone of the interior and entering the sea.

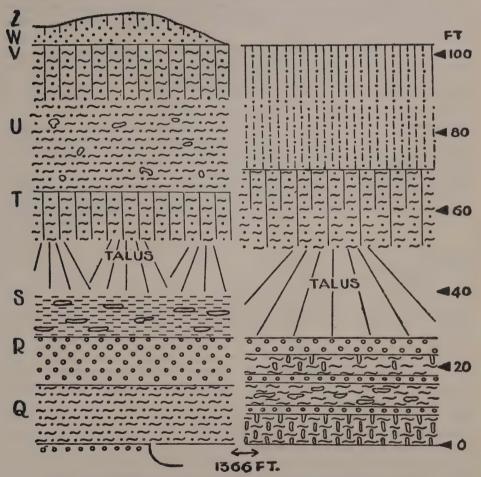


Fig. 3. Sections near Raika village on the left bank of the Mahi river, Gujarat, India.

After Zeuner, The Stone Age and Pleistocene Chronology in Gujarat (1950).

The Nile fulfils these conditions in northern Egypt. Some hundred and fifty miles upstream from its mouth the river is connected with the Fayum Lake, a desert lake which has played an important part in the prehistory of man. As it happens, correlation is possible between terraces of this lake (including its contained industries) and those of the Nile (Zeuner, 1952, 1962, 1963), and the latter can be related to the sea level, as shown in Table II. Whilst this correlation must not be regarded as final, it does at least show the way in which the dry interior of the Saharan belt can be dated in terms of sea-level fluctuations, and thus correlated with other parts of the world.

GEOLOGICAL PHASE	SEA-LEVEL (metres above present sea-level)	NILE TERRACES (metres above flood plain)	FAYUM LAKE (metres above present sea-level)	FAYUM INDUSTRIES
Antepenultimate Interglacial	56	55		
? Great Interglacial	?	45		
Great Interglacial	32.5	33		
Last Interglacial	18	18	42	? Acheulian & Acheulio- Levalloisian
	7.4	9	34	Up. Fayum Levalloisian
First Interstadial of Last Glaciation	3.4	4	28	Fayum Epi- Levalloisian I

TABLE II

Correlation of climatic fluctuations (as evidenced by stranded lake shorelines) in semi-arid regions with the Pleistocene high sea-levels.

One cannot know *a priori* whether a dry inland phase connects with a high sea-level or with a low sea-level phase. In Northern Gujarat, on the northern fringe of the monsoon belt, evidence has been obtained by our research team that low sea-levels are contemporary with humid phases. On the river Mahi, the fossil soil illustrated in Fig. 3 is well developed and it can be shown that it formed a land surface beneath the overlying aeolian and aeolio-fluviatile deposits which descend at a fairly constant gradient to below sea-level. At Vasad, near Baroda, the surface of the buried soil is at +68 ft.; at Dabka, eighteen miles downstream, it has dropped to 24 ft.; at Dewan, another eight miles downstream, it appears at +5 ft., and at Cambay in the open estuary, it has disappeared. It can be calculated that the

gradient is 1 ft. in 2.15 miles between Vasad and Dabka and 1 ft. in 2.4 miles between Dabka and Dewan. These observations, which we intend to supplement during our forthcoming field season, are of considerable importance, since low sea-levels are known to be contemporary with glacial phases in Europe and also with lower water temperatures. It is now becoming evident that at the same time the tropics experienced more humid conditions, at least in certain parts. This does not necessarily mean a general tropical pluvial, since it is possible that the monsoon zone was moving north and south with a rhythm parallel to that of the glaciations.

There are many places in large estuaries where fossil soils can be observed, and an investigation of such sections and of the gradients of the soils themselves is bound to help in establishing a connection between climatic fluctuations and sea-level phases.

In conclusion, it seems to me well worth while to pursue the line of work here indicated, of studying the coast line concurrently with climatic fluctuations inland. Sooner or later the numerous methods of absolute dating of Pleistocene deposits will be extended to ancient shoreline sequences and it will then be possible to achieve not only long distance correlation between continents, but absolute dating of the Pleistocene sequence of Australia. Inevitably some time will elapse before this can be achieved, but it appears to me that the way to this goal is open.

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BOOK REVIEWS

BRODERICK, Alan Houghton. The Abbé Breuil, Prehistorian. London, Hutchinson. 1963. 256 pp. 23 Pls. 1 map. 30s.

The biography of a man whose life was devoted almost exclusively to advancement of our knowledge of Palaeolithic man necessarily involves a fairly full account of his scientific achievement, his relations with his colleagues and of his work with theirs. This demands of the biographer a technical grasp of the subject and a developed critical faculty going far beyond the qualities needed adequately to describe the mere events of a single, if long, life. Mr. Brodrick is known as the author of several books dealing popularly, but accurately, with the technical aspects of Palaeolithic research. He had, moreover, the advantage of personal acquaintance with both his subject and with his many friends, so that much of his account is at first hand and, in the case of Breuil's own opinions, is taken from the subject's own mouth and pen.

Not only Breuil himself, but many of his eminent precursors and contemporaries, most, alas, also by now deceased, come alive again in this study and are installed in their proper niches in History. One omission, however, stands out: Franz Weidenreich, famous as the monographer of *Sinanthropus*, curiously is not accorded even a mention. Known, as they mostly are, to to-day's generation of Palaeolithic students, only by their publications, the personalities presented here are most illuminating.

Breuil's manifold, varied and basic contributions to the present state of our subject are faithfully recorded—and not always uncritically. Too often does an acolyte's natural hero-worship tend to verge on blind idolatry.

Mr. Brodrick has skilfully avoided this trap and convinces us by the fairness of his approach.

There is, perhaps, an over-rigid adherence to the classical framework of Pleistocene chronology and too beautiful a trust in the virtues of radiocarbon and potassium/argon dates, but in a work destined for the general public one cannot expect statements, given primarily for background information, to be hedged about with all the qualifications that might be proper in one for a specialist readership. All students and practitioners of Pleistocene studies and Palaeolithic archaeology will want to read this account of how the lasting foundations were laid and appreciate Breuil's enormous personal part therein.

I. W. CORNWALL

PARROT, André. Sumer. London, Thames and Hudson, 1960. 294 pp. 419 Pls. Nineveh and Babylon. London, Thames and Hudson, 1961. 380 pp. 395 Pls. Arts of Mankind Series I, II. £7 10s. each.

These two volumes belong to the category of fine, de luxe picture-books, to which Messrs. Thames and Hudson have now accustomed us. As usual they have the advantage of technological excellence in production; high-grade colour printing, varied by clever reproductions of metal objects on an appropriate metal underlay, and a text written by an acceptable authority, whom one must forgive if it is popularised beyond the bounds of academic usefulness.

Both books however can claim in other ways to be indispensible for an archaeological library, notably because they contain good illustrations of objects till now rarely photographed. Nineveh in

BOOK REVIEWS

particular presents us with modern reproductions in colour of the seventh century wall-paintings from Til Barsip (Tell Ahmar) in north Syria. After their discovery in 1929, these paintings were faithfully copied by an artist before the mud plaster disintegrated. 'After a single exhibition in 1930 at the Orangerie des Tuileries in Paris', M. Parrot tells us, 'even these copies somehow got mislaid and, despite persistent efforts to trace them, it was only in 1961 that we succeeded in our quest. As originally published, almost all were small reproductions in black-and-white. Today we can present these murals to our readers in all their pristine beauty and with the wealth of colour . . . etc.' This has certainly been done, and very interesting they are; a two-dimensional counterpart of the Assyrian reliefs.

In Sumer, André Malraux' introduction to the abstract qualities of Sumerian art is fine, imaginative stuff such as one would expect from so great a literateur; and some of his points are made by pictorial comparisons, with artists like Brancusi (could not Brancusi have sometimes visited the Louvre?), Rodin and Japanese masters. But the writer tends to be wrongly informed archaeologically. (To quote a small example, Mesopotamian figurines are in fact rarely found 'in tombs', (p.XV)). The text itself on the contrary is of course free from such misapprehensions, though an illustration of the Ninevite bronze head on p.XXIX is printed back-to-front. Perhaps in any case this hardly matters, as the same piece is correctly reproduced elsewhere by all sorts of processes.

SETON LLOYD

YADIN, Ygael. The Art of Warfare in Biblical Lands, in the Light of Archaeological Discovery. London, Weidenfeld and Nicholson. 1963. 484 pp. Illus. in colour. 6 gps.

In view of the large part played in the archaeological record of the Near East by the relics of war, both portable and earth-fast, it is surprising that no comprehensive study of these monuments has been previously undertaken. In a way, the omission has been fortunate, since the subject calls for special qualifications on the part of the author, and few scholars could have attempted it successfully. Professor Yadin is obviously the most qualified of all, and the present volume is, predictably, excellent. Drawing his material from every available source, artifactual, pictorial, and epigraphic, he traces vividly the development of warfare, weapons and fortifications throughout the entire area, from Neolithic to Persian times. The full bibliography (pp. 466-469) shows how conversant he is with the previous specialist literature; but he goes far beyond any previous author in his understanding of the monuments in terms of military needs and techniques, and his introductory chapter, on the basic precepts of the art of war in ancient times, is especially brilliant.

The book touches upon so many aspects of Near Eastern archaeology that it cannot be expected that all of Professor Yadin's opinions will find universal acceptance amongst specialists. There are many debatable points (for example, his interpretation, on p. 62, of the poker-shaped metal objects often found in burials of the late 3rd. millennium); but a discussion of such details cannot be attempted here. Perhaps a reviewer writing for this *Bulletin* might, however, be permitted to point out that Professor Yadin is not quite correct in stating (pp. 298, 372), that, until his small excavation at Megiddo in 1960, the celebrated stables there had generally been attributed to Solomon. In fact, the true date of these structures (in the reign of Ahab) was suspected as long ago as 1940 by J. W. Crowfoot, and was conclusively proved by Miss K. M. Kenyon from the pottery evidence in 1957 (*Samaria III*, p. 159ff).

This is a picture book as well as an archaeological handbook, and the numerous coloured photographs and line drawings are as excellent as the text. Especially useful are the reproductions of reliefs and wall-paintings, showing many interesting details of military equipment and methods; while these illustrations, and those of such beautiful ceremonial weapons as the Byblos axes or the Dorak swords, make this volume an important contribution also to the study of ancient Near Eastern art. The whole thing is superbly done, and the book is well worth its price.

PETER J. PARR

BOOK REVIEWS

MATTHEWS, C. L. Ancient Dunstable: A Prehistory of the District. The Manshead Archaeological Society of Dunstable, Bedfordshire. 1963. 96 pp. 6 Pls. Text Figs. 29. 5s.

This book shows what a local group can achieve in 12 years by using their eyes and recording what otherwise would have passed into oblivion. Dunstable is close to some remarkable sites, we now know: how much would we have known if the Manshead Society had not been founded, and if they had not shown their awareness of their own need of instruction by obtaining tutors from the W.E.A. and from Cambridge Extra Mural Board? This book is richly illustrated with drawings of finds of all periods from the Neolithic to the Saxon, and forms a remarkable interim report. The principal site is Puddlehill, where important Iron Age and Saxon settlements have been excavated as they disappeared into a chalk quarry. As well as much pottery we are offered two hut plans, one Iron Age, the other Saxon, and a partial reconstruction of another remarkable Iron Age hut. This little book will be useful to a wide circle beyond Dunstable because of these drawings. It can be obtained from the Hon. Secretary, Mr. E. C. Hawes, 39 Meadway, Dunstable, Beds.

S. S. FRERE

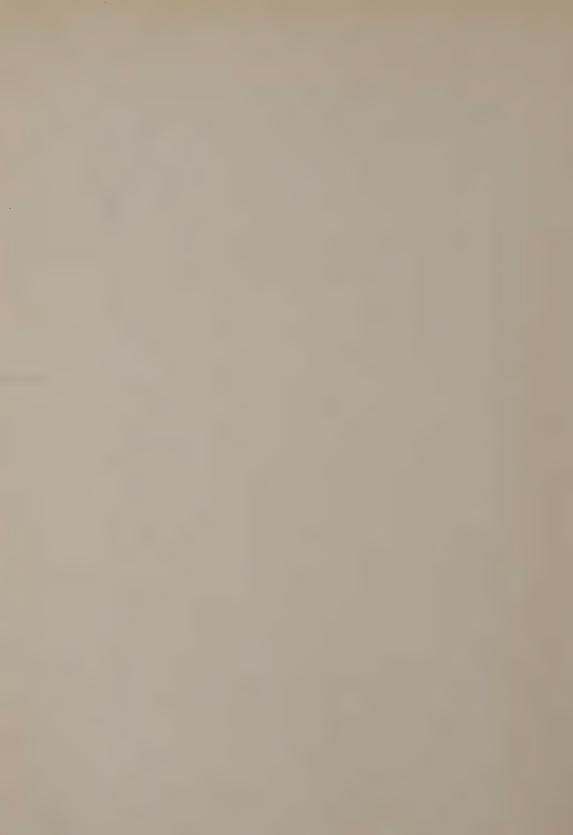
BLAIR, Peter Hunter. Roman Britain and Early England, 55 B.C.—A.D. 871. Vol. 1 of History of England, general editors C. Brooke and D. Mack Smith. Edinburgh, Thomas Nelson. 1963. xii plus 292 pp. 16 Pls. Text Figs. 8. 25s.

This book has the great merit of uniting under one mind and pen two periods in our history so distinct in character and sources that such treatment has been rare. The first ninth of the book is taken up with a discussion of the sources both historical and archaeological, and will prove one of its most valuable contributions: it fails, however, to provide adequate discussion of excavation evidence as such, for instance, in its bearing on the rise and decay of towns or villas. The picture of Roman Britain that emerges is in the space available somewhat conservative though well up-to-date; but the narrative skilfully chooses its points for emphasis. A review of this length lacks space for detailed discussion of points of disagreement such as the difficulty of believing (p.38) that the timber defences of legionary Lincoln were still serviceable a century after construction (whatever the explanation), or the dating of the Silchester defences (p.106). In the discussion of the Army of Britain more emphasis might be profitably laid on the diplomas. There are new and suggestive points made about Agricola's advance and the subsequent retreat from Scotland, and about the Hadrianic frontier and the Antonine Wall; in all this the author's close acquaintance with the Saxon period enables striking analogies to be drawn. The treatment of urban history is stimulating and well-informed, though more could be made of the flourishing development of towns in the Antonine age. The discussion of farming and industrial activities follows conventional lines, and one feels the need for a more historical treatment. The confused centuries between the end of Roman Britain and the establishment of Saxon England are sensibly discussed, with constant reference to the validity of evidence, though many would not accept the evidential value of 'Romano-Saxon' pottery. There are interesting discussions of Saxon shipping and of the cemetery evidence from Kent; and a credible picture of the slow growth of Anglo-Saxon settlement, below the plane of military fluctuation, is built up on the supporting evidence of early place-names. The detailed treatment area by area of early kingdoms, linked backwards with Roman Britain and forwards with absorption into larger units, is clearly the result of long study and close acquaintance with all the evidence. This reviewer is not competent to criticise these sections, but records the stimulating nature of the ideas promoted. The book takes the historical account down to 871 and ends with a chapter on the nature of Anglo-Saxon Society, where once again the account is embellished by backward glances at Roman Britain. The great value of the book thus lies in its linking of two disciplines, and it should not only prove stimulating to students of each, but also encourage more students to study both.

S. S. FRERE









1. Main Printing Room, with central sink, contact printer and enlargers on benches.



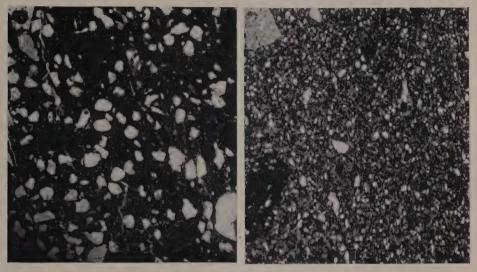
2. Studio looking east. From left to right: student darkrooms, drying area, and entrance to negative processing room, print room and office.



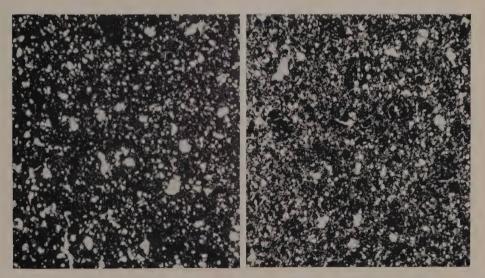
 Studio looking westwards. From left to right: changing room, entrance, student darkrooms, drying area (extreme right).



2. Studio, showing copying area and vertical camera equipment.



1, 2. Sherds from Windmill Hill.

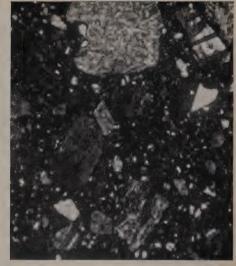


3. Fired clay with flints, Avebury district.

4. Fired 'brick earth', Avebury district.



1. Sherd from Windmill Hill.



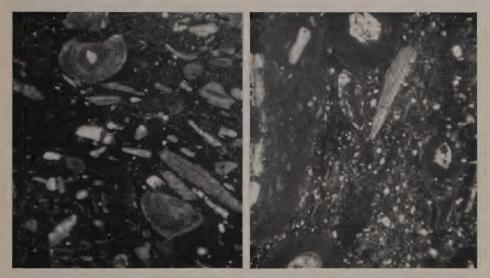
2. Sherd from Maiden Castle.



3. Sherd from Robin Hood's Ball.



4. Sherd from Hembury.



1. Sherd from Windmill Hill.

2. Sherd from Robin Hood's Ball.



1. View of bedrock in Area AC, showing the pits and postholes.



2. One of the child burials.
(Brightly-coloured brick debris from the level above has filled the body-cavity so that the outline stands out against the dark material of the camp level).



3. The west wall of the earliest brick house resting on the dark deposit which contains the child-skeletons.



4. The part of the earliest brick house which lay within Area AC.



5. Remains of the second brick house, showing the floors of the two 'ovens' and the ash-filled pit.



1. The earliest *pisé* house, as uncovered in Square C in the 1960 season.



2. The earliest *pisé* house, with the western room uncovered in 1959.



3. The Middle Neolithic house found in Area BD.



4. Part of a slightly later house lying at the western end of Area BD.



- 1. (above) E.N.I. bowl.
- 2. (right) Oval bowl from the pit which produced the figurines Pl. v, 1 and Fig. 11, 8.





4. Part of a short-necked jar from an early level of the E.N.I. phase.



7. One of the 'pottery pits', showing the crushed pots *in situ*.

Scales: for 1, 3, 4: ins. and cms.; 5, 6: cms.;

7: 5 cm. units.



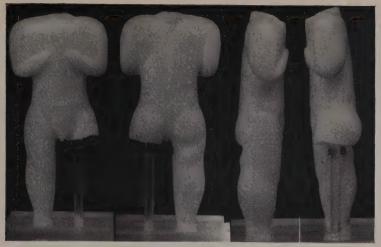
3. Carinated bowl from the smaller pit beside it.



5. Jars from the 'pottery pits' in the destruction level of the M.N. square house.



6. Hole-mouth pots from the 'pottery pits'.



Standing male figurine in marble, from the larger of two pits cut down into bedrock from the destruction level of the second brick house (²/₃).



2. Standing stone figurine from a late E.N.I level $\binom{2}{3}$.





3a, 3b. Front and back views of the largest of the later Neolithic clay figurines found (2/3). (The incised decoration, which seems to be intended to represent clothing, retains traces of both white and red incrustation).



1. Barrow 36f: satellite burial A.

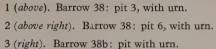




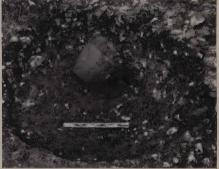
2. (left) Barrow 36f: satellite burial B.

3. (above) Barrows 36f, 37: soil feature.











4. Barrows 38-9: the junction of the barrow ditches on the north side (Barrow 39 on left). Pit 7 of Barrow 38 appears in section immediately behind and to right of ranging-rod.





1



3

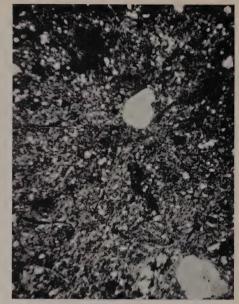
4



The Cave as finally excavated.



1. Mardley Heath



2. Blackfan Wood



3. Potters Heath (1)



4. Potters Heath (2)





INSTITUTE OF ARCHAEOLOGY

Eighteenth

ANNUAL REPORT

1 August 1960 — 31 July 1961

INSTITUTE OF ARCHAEOLOGY

COMMITTEE OF MANAGEMENT

THE VICE-CHANCELLOR (Dr. C. F. Harris)

THE CHAIRMAN OF CONVOCATION (Dr. P. Dunsheath)

THE PRINCIPAL (Sir Douglas Logan)

The Director of the Institute (Professor W. F. Grimes)

The Director of the Courtauld Institute of Art (Professor Sir A. Blunt)

The Director of the Institute of Classical Studies (Professor E. G. Turner)

The Director of the Warburg Institute (Professor E. H. J. Gombrich)

The President of the Council for British Archaeology (or other representative) (Dr. D. B. Harden)

The President of the Prehistoric Society (or other representative) (Mr. J. D. Cowen)
The President of the Society of Antiquaries of London (or other representative)
(Sir Mortimer Wheeler)

Recognised or Appointed Teachers in cognate subjects, or Heads of Schools or Institutes in the University:—

Professor K. de B. Codrington Dr. P. S. Noble

Professor W. B. Emery
Professor C. Daryll Forde
Dr. J. F. Lockwood
Professor S. W. Wooldridge

Two members of the Academic Staff nominated by the Academic Board:—
Professor J. D. Evans

Mr. S. S. Frere

Five other persons: -

Professor R. R. Betts

Mr. R. L. S. Bruce-Mitford

Professor J. G. D. Clark

Dr. E. G. M. Fletcher

Professor D. McKie

Professor Wooldridge again served as Chairman throughout the Session.

The Committee suffered a loss in the death of Professor Betts in May, 1961.

Professor Betts had taken a regular part in its work since his appointment in October, 1960.

REPORT OF THE DIRECTOR FOR THE SESSION 1960/61

ADMINISTRATION

Director: Professor W. F. Grimes, C.B.E., M.A., F.S.A., F.M.A.

Secretary and Registrar: E. Pyddoke, F.S.A. Director's Secretary: Miss M. J. Hurrell, B.A.

Senior Clerks: Miss M. F. Varese
Mrs. M. Hunt

Clerks: Miss G. Kemp

Miss J. A. Charlesworth

Miss M. Exton (from July, 1961)

Staff matters

The Director continued to serve as Chairman of the British Association Research Committee on Ancient Fields and of the Council for British Archaeology Committee for Industrial Archaeology. He was appointed Chairman of the London Topographical Society. He was elected a Vice-President of the Council for British Archaeology.

At the invitation of the University of Baroda, Professor Zeuner delivered the Maharaja Sayajirao Memorial Lectures for 1960-61 on the subject of chronological research in India. During his stay in India, methods of research and teaching were demonstrated at the newly-built Department of Archaeology and Ancient History in Baroda, the head of which is Dr. B. Subbarao. The Archaeological Department of Poona University was also visited. Professor Zeuner also attended in New York, at the invitation of the New York Academy of Sciences, a symposium on 'Solar variation, climatic changes and related geophysical subjects' and gave guest-lectures at Harvard, Yale and Washington.

Dr. Cornwall spent three months in Mexico at the invitation of Dr. José Lorenzo of the Dirección de Prehistoria, Instituto Nacional de Antropología e Historia, advising in the setting up of a laboratory for soil studies and initiating research and field work. He continued to serve on the British Association Committee to investigate the denudation and burial of archaeological structures.

Professor Evans attended the Summer Course in Archaeology of the University of Barcelona, which was held in the Balearic Islands, and delivered two lectures. He also took part in the C.B.A. Conference on the Bronze Age which was held in December.

Dr. Hodson took part in the Colloque Atlantique of the Société Préhistorique Française in Brittany.

Professor Mallowan was elected President of the new British Institute of Persian Studies. In March he attended the inauguration ceremony at Tehran

INSTITUTE OF ARCHAEOLOGY

University, and was present when H.R.H. the Duke of Edinburgh thanked the Chancellor for the house which was allocated to the Institute. He was invited by the Foreign Office to serve on a mixed Anglo-Iraqi Commission established as the result of the Cultural Agreement between the Government of the U.K. and the Republic of Iraq. He also served as Vice-President of the British Academy for the year 1960-61. He delivered the Woolley Memorial Lecture at the Annual General Meeting of the British School of Archaeology in Iraq.

Mrs. K. R. Maxwell-Hyslop having signified her intention of resigning at the end of the Session, Miss Barbara Parker, F.S.A., was appointed Lecturer (parttime) in Western Asiatic Archaeology in her place as from October 1st, 1961. Mrs. Maxwell-Hyslop was one of the first students of the Institute, taking the Diploma in Mesopotamian Archaeology in 1936. She rendered valuable service as a member of the teaching staff from 1945.

Mr. Hodges was invited to lecture on the Education and Training of Conservators at the Rome Conference of the International Institute for the Conservation of Historic and Artistic Works. He lectured on the same subject for the Museums Association at their Conference in Plymouth. He also took part in a symposium at the European Headquarters (Burg Wartenstein) of the Wenner-Gren Foundation on the subject of Ceramics and Man.

Mr. S. Rees-Jones having been appointed to a post in the Department of Archaeology in the Queen's University of Belfast, Mr. A. Marshall was appointed to succeed him as Technician in the Conservation Department. Mr. Marshall will take up his appointment at the beginning of the 1961-2 session.

Public Lectures and Exhibitions

A total of 19 public lectures was given during the session.

Professor Daniel Schlumberger of Strasbourg University delivered two Special University Lectures in the summer term, his subjects being 'Greco-Buddhist Art and Greco-Roman Art' and 'Greco-Buddhist Art and Parthian Art'. Attendances averaged 85. In the winter term Professor Robert Heizer of the University of California gave two Special University Lectures under the joint auspices of the Boards of Studies in Anthropology and Archaeology on 'La Venta and the Ecology of the Olmec Civilisation' with average attendances of 54.

As in previous years a series of general lectures was arranged, their subjects covering a wide variety of archaeological topics, British and overseas. Audiences averaged 63. Miss Taylor, Professor Zeuner and Dr. Cornwall participated in this series, the other lecturers being Messrs. J. Wacher (Leicester University), C. H Houlder (Royal Commission on Ancient Monuments (Wales and Monmouthshire)), R. Robertson Mackay (Ministry of Works) and E. Clive Rouse, Dr. G. W. Dimbleby

(Oxford University) and Dr. P. Salway (Cambridge University). In the summer term also Professor Codrington and Dr. F. R. Allchin gave between them a course of four lectures on Indian archaeology at which attendances averaged 33. There were fewer visiting scholars than in the previous year but Miss Diana Kirkbride lectured on her work in Trans-Jordan in November and Dr. S. R. Rao, Superintendent of the Department of Archaeology, Government of India, lectured on Excavations at the harbour site of Lothal in Gujarat, India' in June.

In connexion with the Bronze Age Conference of the Council for British Archaeology in December a temporary exhibition of recent discoveries of the period was arranged in the vestibule. The Prehistoric Society's Easter conference took as its subject 'Africa' and for this also an exhibition which included selected material from the Institute's collections was arranged by Dr. Waechter. Students of the Conservation Department under the guidance of Mr. S. Rees-Jones of the Courtauld Institute, whose help in this and in other matters is gratefully acknowledged, designed and carried out an exhibition illustrating Pigments through the Ages.

A two-day conference organised by the Council for British Archaeology on Archaeology and Physics' was held at the Institute on March 4th-5th. It was accompanied by an exhibition of instruments and was followed by a valuable symposium in which a number of the specialists participated.

The Institute continued to co-operate with the Extra-Mural Department in teaching for the University Extension Diploma in Archaeology. Several of the courses were held in the building and were given by Mr. Frere and Miss Sheldon, and by past or present students, Mrs. Christie, Dr. Seton Williams and Mr. Robertson Mackay. The Director again acted as External Examiner.

Students

The total number of students registered at the Institute during the Session was 88; besides these 79 Intercollegiate students attended courses. Of those registered at the Institute 15 were registered for Diplomas, 30 for Higher Degrees, 9 for special research under Statute 21 (iii)—2 full-time and 7 part-time—and 12 as full-time Technical students; 15 Occasional students have been attending lectures and using the facilities of the Institute and 7 students have attended courses as full-time Occasional students.

Two students were awarded the Diploma in European Archaeology (Section A: Prehistoric Europe) and one student was awarded the Diploma in Prehistoric Archaeology.

Of the 30 students registered for Higher Degrees, 12 were registered for the Ph.D. full-time (3 of these in the Faculty of Science) and 6 part-time (1 of these

in the Faculty of Science); 7 were registered for the M.A. full-time and 5 part-time. Of the foregoing Miss Andrée Rosenfeld was awarded the Ph.D. degree for her thesis on 'The Pleistocene Deposits of Three Holes Cave, South Devon' and Mr. Geoffrey Wainwright was awarded the Ph.D. Degree for his thesis on 'The Mesolithic period in South and Western Britain'.

Three full-time Conservation students qualified for the Institute's internal certificate for Conservation and Technology.

The following overseas countries were represented among students registered at the Institute: Australia, 4; U.S.A., 4; India, 2; Pakistan, 2; Israel, 2; Portugal, 2; one each from Burma, Ceylon, Holland, Iran, Iraq, Jordan, Malta, Nigeria, S. Africa, S. Rhodesia.

Teaching Collections

The following were the chief additions:

A series of Thessalian Neolithic sherds, given by Dr. D. Theocharis, Ephor of Antiquities for Thessaly, Volos.

A series of sherds and flints from Irish sand-hill sites, Peacocks Farm and Little Woodbury, given by Mr. S. S. Frere.

Bronzes, sherds and an antler sleeve from Swiss sites, given by Mr. V. Megaw in return for some duplicates from the Institute Teaching Collections for the Department of Archaeology of Sidney University.

Other Gifts

Dr. M. A. Murray presented a large collection of lantern slides, with a number of negatives, of Egyptian subjects.

Gordon Childe Prize and Memorial Fund

The Gordon Childe Prize for 1960-61 was divided between Miss Joanna Close-Brooks and Miss Mary-Jane Mountain, both of whom were successful in the June examination for the Academic Post-Graduate Diploma in European Prehistory.

Grants from the Memorial Fund were made to Messrs. C. A. Burney and J. Mellaart and Dr. V. M. Seton-Williams towards excavation at Yanik Tepe, Catal Hüyük and Tell Rifa'at respectively; and to Dr. T. Sulimirski towards his travelling expenses for a study-tour in eastern Europe.

TEACHING AND RESEARCH

Institute Field Course

The field course was held at Druid's Lodge near Amesbury and thanks are again due to Messrs. Felix Fenston and R. Turpin and their staff for much very generous help. The excavation exercise was one of a number of barrows on Middle

Farm, in the parish of Rollestone, which was undertaken as a rescue-operation on behalf of the Ancient Monuments Department of the Ministry of Works, which again lent equipment and gave a grant towards the general expenses. Though the primary burial had already been removed the barrow yielded a number of secondary burials of the Middle Bronze Age. The survey of the monument was carried out by students under the direction of Mr. Stewart and the excavation was supported by exercises in field-work and interpretation on barrow-groups and other sites in the Stonehenge and Wylye Valley areas.

An average of 28 students per week attended the three-week course which was under the general direction of the Director, Professor Evans and Dr. Hodson, with the Secretary responsible for administration. Mr. Cookson gave instruction in photography and Dr. Cornwall and Dr. Waechter dealt with environmental subjects. It can fairly be said that the course is now securely established, but is capable of further development in the light of growing experience.

The Institute participated in a joint expedition with Leeds University under the leadership of Dr. B. S. J. Isserlin to undertake excavations in the Phoenician settlement at Motya. Miss du Plat Taylor and Miss Talbot participated in the work and Mr. Cookson was responsible for the photography.

Diploma in Iranian Archaeology

Following discussions over the course of the Session the University has instituted an additional Option in the Post-Graduate Academic Diploma in Western Asiatic Archaeology. The new option provides for a Diploma in Iranian Archaeology in two sections, the earlier ('From the earliest times to the death of Alexander') to be taught at the Institute, the later ('From the accession of Cyprus to the advent of Islam') at the School of Oriental and African Studies. It thus provides a new opportunity for integration in archaeological teaching. Its institution at this time is particularly opportune in view of the establishment in Tehran of a British Institute and it should be particularly valuable as a basis for archaeological training for Persian scholars.

Internal Diploma in the Conservation of Historical Monuments

Early in the session the Committee of Management was approached with the suggestion that the Institute should take responsibility for a course in building conservation the purpose of which would be to provide practising architects with the necessary academic training for work on the preservation of historic buildings, on the need for which there was general agreement amongst official and other bodies. The course was to replace the part-time course at the Bartlett School of Architecture which was shortly to come to an end. The Committee expressed

its willingness to accept responsibility for the course provided that funds could be made available from outside sources.

The Standing Joint Conference for the Recruitment and Training of Architects in the Treatment of Historic Buildings, which had initiated the proposal, was successful in obtaining a grant of £10,000 from the Gulbenkian Foundation which will make it possible to run the course for an experimental period of five years. At the end of that time the future of the course will rest with the University, which is at present uncommitted with regard to it; in the meantime candidates who successfully complete the two-year course will receive an Internal Diploma of the Institute. Mr. W. A. Eden, M.A., F.R.I.B.A., F.S.A., will be assisted as Director of Studies by a panel of part-time experts and the course will open in October, 1961.

The Hayter Sub-Committee (U.G.C.) on Oriental, African, Slavonic and East European Studies

The Institute was invited at somewhat short notice to submit a statement to the Sub-Committee. The statement outlined the part which the Institute has already played in archaeological teaching and research in these regions. In particular it expressed the needs for the expansion of teaching in Slavonic and Eastern European archaeology, in which a beginning has been made with the help of Dr. Sulimirski, and for scholarships and grants for travel and research. The Institute was not given an opportunity of considering the Sub-Committee's Report though it is understood that it was available to some institutions of the University before the end of the session.

Occasional Paper No. 11

Problems of the Iron Age in Southern Britain, a collection of papers which was the outcome of the Council for British Archaeology's conference on this subject in December 1958, was published during the year. The Council collaborated in meeting the cost of this volume of 308 pages and thanks are due also to Mr. I. D. Margary for generous help in connexion with it. The publication was edited by Mr. Frere.

THE DEPARTMENTS

The Director's general introductory course on archaeology was attended by 18 Intercollegiate students. He continued to direct the excavations in the City of London. With Dr. G. W. Dimbleby he completed the investigation of a megalithic tomb known as Bedd yr Afanc in Pembrokeshire. He also continued his work on continental beaker cultures.

Publications:

'Some smaller settlements: a Symposium', in Frere (ed.), Problems of the Iron Age in Southern Britain (Inst. of Arch. Occasional Paper No. 11, 1960), pp. 17-21. Various articles for the Encyclopaedia Britannica.

ENVIRONMENTAL ARCHAEOLOGY

Professor: F. E. Zeuner, Ph.D., D.Sc., F.S.A.

Lecturer: I. W. Cornwall, B.A., Ph.D.

Lecturer in Palaeolithic Archaeology: J. d'A. Waechter, Ph.D., F.S.A.

Assistant: Miss J. M. Sheldon Honorary Assistant: Mrs. R. Barton

The number of students working in the Department during the year was 17, 8 being registered for Ph.D., 1 for M.A., 2 for the Postgraduate Diploma in Prehistoric Archaeology, and 6 as Research Students under Statute 21 (iii). Of the Higher Degree students, 4 were registered in the Faculty of Science and 5 in the Faculty of Arts. These students worked on the following subjects during the session:—

Ph.D.

- R. W. Andrews (Faculty of Science (part-time)): British varved clays.
- J. Clutton-Brock (Mrs. Jewell) (Faculty of Science): Faunas from prehistoric sites.
- C. Grigson, Miss (Faculty of Science): Prehistoric cattle remains from Europe.
- G. W. P. Jarvis (Faculty of Arts (part-time)): Sites in the Lea Valley.
- S. Pearce, Miss (Faculty of Arts): Studies in the Iron Age of Eastern Africa.
- J. Philips, Miss (Faculty of Arts (part-time)): Indian Lower Palaeolithic.
- A. Rosenfeld, Miss (Faculty of Science): Archaeological deposits of Torbryan Caves, Devon.
- G. J. Wainwright (Faculty of Arts): Mesolithic of southern and western Britain.

M.A.

E. A. Dowding, Miss (Faculty of Arts): Environmental Archaeology.

Statute 21 (iii)

- U. Chantrill, Mrs. (part-time): Occurrence and composition of brick-earths.
- M. Collins, Miss: Macroscopic plant remains.
- A. Grosvenor-Ellis, Miss (Mrs. Knowles) (part-time): Fauna of Neolithic Jericho.
- I. Neeruri: Lithic industries of north-west Africa.
- A. C. Western, Miss (part-time): Identification of wood from archaeological deposits.
- B. Westley, Mrs. (part-time): Faunas from archaeological sites.

Of the Higher Degree students, Miss Rosenfeld and Mr. Wainwright presented their theses entitled 'The Pleistocene deposits of Three Holes Cave, Devon' and

'The Mesolithic of south and western Britain', respectively. They were both awarded the degree of Doctor of Philosophy. Mr. I. Crawford was successful at the Diploma examinations in June.

Research was continued by Professor Zeuner on the prehistory of the Canary Islands. While in India he carried out field-work on the Mahi, Narbadda and Godavari rivers, resulting in the establishment of a connection between river terraces and sea-levels which, it is hoped, will ultimately lead to a correlation of Indian and European Palaeolithic chronology.

Dr. Cornwall visited a number of excavations in this country at the request of the excavators in order to study soil problems. Six applications to study archaeological materials, soils or bones were accepted during the year, involving over 100 specimens. They came from the following sites: Colnbrook, Bucks (Pleistocene), Brean Down, Somerset (Mesolithic-Beaker), Normanton Down, Wilts (Neolithic), High Rocks, Kent (Iron Age), Bury Wood, Wilts (Iron Age), Cranbrook, Kent (Roman).

Mrs. Westley dealt with over 400 fragments of bones from an Iron Age site in Nakuru, Kenya. Messrs. G. H. Bunting and D. W. Verity identified various animal and human bones from archaeological sites and wrote reports for the excavators.

Dr. Waechter continued his survey of river terrace sites in the Middle Thames area and also investigated the Acheulian site of Keswick, Norfolk, to be visited by Section H of the British Association at the September 1961 meeting.

Publications

By Professor Zeuner:

'La cronologia de las poblaciones de las Islas Canarias', *Estud. Canarios* No. 4 (1959), pp. 34-40.

'On the origin of the Cinder Mounds of the Bellary District, India', Bulletin of the Institute of Archaeology, No. 2, 1959, pp. 37-44.

'Prehistoric Hand-adzes from Gran Canaria', Man, 8 (1961), pp. 20-22.

'Excavations at the site called "The Old Grotto", Torbryan', *Devon. Assoc.* 92 (1960), pp. 311-330.

'Advances in chronological research', Viking Fund Publ. Anthrop. No. 28 (1961), pp. 325-343.

'The shore-line chronology of the Palaeolithic of Abri Zumoffen, Adlun Caves, Lebanon', Bull. Mus. Beyrouth, 16 (1961), pp. 49-59.

'Animal remains from a Late Bronze Age sanctuary on Cyprus and the problem of the domestication of Fallow Deer', *J. Palaeont. Soc. India* 3 (1958), pp. 131-135.

By Dr. Cornwall:

'Report on the soil samples from Down Farm, Pewsey, Wilts', Wilts. Archaeol. and Nat. Hist. Mag. 57 (1960), pp. 348-349.

'Report on the cremations and on the soil samples from Penmaenmawr, North Wales', Proc. Prehist. Soc. 26 (1960), 335-338.

'Soil investigation in the service of archaeology', Viking Fund Publ. Anthrop. No. 28 (1961), pp. 265-284.

The Making of Man. London (Phoenix) (1960) 63 pp.

INDIAN ARCHAEOLOGY

Professor: K. de B. Codrington, M.A.

Three students were registered for higher degrees as follows:

Ph.D.

A. H. Mirza (Faculty of Arts): Arts and Crafts of the Mughal Courts.

H. A. Ratnayake (Faculty of Arts): Arts and Crafts of Ceylon.

(The supervision of the work of these students is being shared with Mr. H. W. M. Hodges.)

M.A.

I. A. R. Naik, Miss (Faculty of Arts): The culture of the Nilgiri Graves.

A number of students from other Schools of the University and from Oxford, Cambridge and Reading have sought instruction on Indian Numismatics and other aspects of Indian Archaeology and the History of Indian Art. Visits to the National Museums continue to be well attended and it is hoped to re-organise the programme to meet the demands of other teachers of oriental subjects in the University. Expeditions have been made during the year in term time to Oldbury, Bow Hill and Lewes and, in vacation, to Snowdonia, Portland, Swanage and the Isle of Wight.

Dr. F. R. Allchin, Lecturer in Indian Studies at Cambridge, continues to work both at the Institute and at the School of Oriental and African Studies. His valuable co-operation is much appreciated.

PREHISTORIC EUROPEAN ARCHAEOLOGY

Professor: J. D. Evans, M.A., Ph.D., F.S.A.

Lecturer: F. R. Hodson, M.A., Ph.D.

Special Lecturer in Central and East European Prehistory: T. Sulimirski, Jur.D. Ph.D. (Lwow), Hon. F.S.A.

There were 9 full-time students working for the Postgraduate Diploma, 5 first year and 4 second year. Of the second year students, 3 sat the Diploma examination in June, two being successful. They were Miss J. Close-Brooks and Miss

M. J. Mountain, who were also jointly awarded the Gordon Childe Memorial Prize for the session.

There were 6 students registered for Higher Degrees, as follows:—

Ph.D.

- R. R. Mackay (Faculty of Arts (part-time)): Beaker domestic sites in Britain with special reference to East Anglia.
- D. Britton (Faculty of Arts): Some aspects of the metal industry in Prehistoric Europe, especially in Britain.
- P. J. Ucko (Faculty of Arts): The Prehistoric Anthropomorphic Figurines of the Ancient Near East and the Aegean.
- S. Mann, Miss (Faculty of Arts (part-time)): Mediterranean Prehistory (title to be chosen later).

M.A.

- G. Pike, Mrs. (Faculty of Arts): Land transport in the Western Mediterranean Region in pre-Roman times.
- E. Coult, Mrs. (Faculty of Arts): Post-Palaeolithic Stone Industries of Great Britain.

Teaching was also provided for 1 Occasional and 16 Intercollegiate students.

The Professor concluded his excavations in the Neolithic site at Knossos in a four-week season in August, 1960. 3 students from the Department took part in this work.

Dr. Hodson spent the Easter Vacation at the British School at Rome, studying and classifying material from recent excavations at Veii. This work was undertaken at the request of the Director of the School and under its auspices.

Dr. Sulimirski made one study-tour in Eastern Europe (to Poland, Czecho-slovakia and Austria) in connexion with a book on the prehistory of the region.

Publications

By Professor Evans:

Segreti dell'Antica Malta (Italian edition of Malta, Milan, 1961), 263 pp.

'Malta and the Mediterranean', Antiquity, 135 (Sept., 1960), pp. 218-20.

'C.14 Date for the Maltese Early Neolithic', Antiquity, 138 (June, 1961).

Articles on 'The Eastern Mediterranean', 'The Western Mediterranean', 'Carnac' and 'Trade-routes (pre-Hellenic Greece)' in the *Concise Encyclopaedia of Archaeology*, Hutchinson (1960).

'The Knossos before Minos', *Illustrated London News* (July 8th, 1961), pp. 60-61. Various reviews.

By Dr. Hodson:

Various reviews.

By Dr. Sulimirski:

'The Cimmarian Problem', Bullettn of the Institute of Archaeology, No. 2, 1959, pp. 45-64.

'Remarks concerning the distribution of some varieties of flint in Poland', Swiatowit, XXIII, Warsaw, 1960, pp. 281-307.

Various reviews.

ARCHAEOLOGY OF THE ROMAN PROVINCES

Reader: S. S. Frere, M.A., F.S.A.

There were 10 students working in the Department, three of whom were registered for the Postgraduate Diploma.

Seven candidates were registered for higher degrees as follows:—

Ph.D.

A. Birchall, Miss (Faculty of Arts): The Belgae.

M. Rennie, Miss (Faculty of Arts): The Continental affinities of Iron Age A cultures of southern Britain.

M.A.

- J. A. Ellison, (Faculty of Arts): Roman coarse pottery (Verulamium and territory of the Catuvellauni).
- J. Alcock, Miss (Faculty of Arts (part-time)): Romano-British religion.
- M. Brennand, Miss (Faculty of Arts (part-time)): Mosaic Pavements in Britain.
- H. F. Cleere, (Faculty of Arts (part-time)): Romano-British Iron.
- W. H. Manning, (Faculty of Arts (part-time)): Romano-British Ironwork.

Regular courses of lectures on Roman Britain and on the Western Empire were given and were attended by a total of 31 Intercollegiate students.

Work was continued on the pottery from Roman and medieval Canterbury and on the Roman wall-plaster, pottery and small finds from Verulamium. The Romano-British card-index has been enlarged, especially by a collection of photographs of the sculpture in the Cirencester Museum, made by Mr. Cookson, and by a number of photographs made on the occasion of the Exhibition of Art in Roman Britain.

In association with Mr. D. F. Allen, a card index of Celtic coinage in Britain has been developed, each coin being illustrated by enlarged photographs with all available particulars. Coins in Norwich, Saffron Walden and the Fitzwilliam Museum have been photographed: 1400 cards have been added to the index.

The Reader directed excavations at Verulamium for six weeks in August and September, 1960, and supervised two weeks' excavation carried out by Mr. J. A. Ellison there in January. Two weeks' field work on Roman sites in Wales was

carried out with Dr. St. Joseph in March. In April an expedition was made to Lezoux, France, in conjunction with members of Leeds and Oxford Universities to carry out a magnetic survey for the sites of Samian pottery kilns.

Publications

By Mr. Frere:

Problems of the Iron Age in Southern Britain, Institute Occasional Paper No. 11. (Edited).

'Verulamium 1960: sixth interim report', Antiquaries Journal XLI (1961), pp.72-85. 'Civitas: A Myth?', Antiquity XXXV (1961), pp. 29-36.

'Some Problems of the Later Iron Age', Problems of the Iron Age in Southern Britain, pp. 84-92.

WESTERN ASIATIC ARCHAEOLOGY

Professor: M. E. L. Mallowan, C.B.E., M.A., D.Lit., F.B.A., F.S.A.

Lecturer in Palestinian Archaeology: Miss K. M. Kenyon, C.B.E., M.A., D.Lit., F.B.A., F.S.A.

Lecturer: Mrs. K. R. Maxwell-Hyslop, F.S.A.

The number of full-time students in the Department was 11 of whom 7 were studying Mesopotamian Archaeology and 4 Palestinian. There were three full-time Occasional students.

Students were registered for higher degrees as follows:-

Western Asiatic

Ph.D

H. Browne, Miss (Mrs. Crawford) (Faculty of Arts): The Archaeology of the Early Dynastic Period.

M.A.

- A. Durrani (Faculty of Arts): Connexion between the Indus Valley and Mesopotamia.
- T. A. L. W. Madhloom, (Faculty of Arts): The Chronological Development of Neo-Assyrian Art.

Palestinian

Ph.D.

- F. James, Mrs. (Faculty of Arts): Bethshan in the Late Bronze Ages and Early Iron Age.
- C. Epstein, Miss (Faculty of Arts): The Bichrome Pottery of Palestine in the Late Bronze Age and its connexions.

M.A.

R. Dajani (Faculty of Arts): The culture of eastern Jordan in the Iron Age.

A class of 24 students attended the course in the Rise of Civilisation in the Near East, and 15 students attending the course on Syria and Assyria. A class of 15 students attended the first year course on Palestinian Archaeology and 6 the second year course.

Tutorials were given for students from the School of Oriental and African Studies studying the Akkadian language. Diploma students for the Palestinian Diploma attended a course in Hebrew at University College.

The Department continued its research activities. Dr. Kenyon directed the first campaign of excavations in Jerusalem of the British School of Archaeology in Jerusalem from May to August. The excavations have already had very important results bearing on the history of Jerusalem. Mrs. Maxwell-Hyslop visited Turkey and Greece to continue her work on bronzes.

Publications

By Professor Mallowan:

'The Birth of Written History', Chap. III (pp. 65-96) of *The Dawn of Civilisation* (ed. Stuart Piggott) Thomas & Hudson.

Various articles in Encyclopaedia Britannica and Chambers' Encyclopaedia.

By Dr. Kenyon:

Various articles in Encyclopaedia Britannica, Chambers' Encyclopaedia and Hastings' Dictionary of the Bible.

By Mrs. Maxwell Hyslop:

'An Urartian Archer on the Zinjirli chariot relief', Bulletin of the Institute of Archaeology, No. 2, 1959, pp. 65-6.

DRAWING AND SURVEYING

Lecturer: H. M. Stewart, B.A.

Students attending courses in Drawing numbered 28 (11 Diploma, 14 Conservation, 3 Occasional) and in Surveying 17 (11 Diploma, 4 Conservation, 2 Occasional).

The extension of the Conservation course to two years has made possible the addition of Surveying to the syllabus, and students following this course now play a fuller part in excavations.

The Department has received a theodolite on loan from Dr. F. Celoria of the London Museum. It will be made available to students, staff and other approved persons.

Amongst the various services provided by the Department was the completion

of 70 plates of line-drawings for R. A. Caminos and T. G. H. James, Gebel el Silsileh, Vol. 1 (Archaeological Survey, Egypt Exploration Society).

PHOTOGRAPHY

Lecturer: M. B. Cookson
Assistant: Mrs. M. V. Conlon

There were 22 students in the Department (12 Diploma, 10 Conservation). In addition a member of the staff of the British Museum attended throughout the Session for specialized instruction. Increasing use was made of the Department's equipment and facilities for vacation work by both Diploma and Conservation students. Much increased numbers of lantern slides and prints were produced for other departments.

As in the past the Department made its contribution to research. The Lecturer again undertook the photography for the Verulamium excavations as well as for two other sites. In the Long Vacation he was invited to make a complete photographic record of the excavations at Motya, Sicily, which were being conducted by Dr. B. S. J. Isserlin of the University of Leeds. In addition, the Department has co-operated with the Reader in the Archaeology of the Roman Provinces in the Index of Romano-British archaeological material on which he is engaged.

The Department continues to receive requests for advice from museums and other organisations in problems of specialised photography. The Lecturer has given a number of lectures to photographic societies and others and visitors from Holland, Denmark, India, Pakistan and the U.S.A. have inspected the laboratories and storage arrangements.

The following equipment has been acquired:—(1) a print washer; (2) a timing wall clock; (3) a pair of floodlights. A number of other pieces of equipment has been repaired.

CONSERVATION

Lecturer-in-charge: Miss Ione Gedye, B.A., F.I.I.C.

Lecturer: H. W. M. Hodges, F.I.I.C.

Twenty-five students worked in the Department, of whom 13 followed the Conservation course, 4 being in their second year. The remaining 12 were Diploma and Higher Degree students. In addition special courses were given to Museum Assistants from the British Museum and Guildford Museum.

Miss E. Cartwright, Miss M. Mallet and Miss C. Reed qualified for the Certificate in Conservation.

As in previous years, work of instructional value to the students was undertaken for a number of museums and excavations. Amongst the museums were Alton (Curtis Museum), Aylesbury, Corinium Museum, Canterbury, Guildford,

Lewes, Swansea, Salisbury, York and Winchester. Excavations were represented by Caterbury, Verulamium, Lovedon Hill (Lincoln), Nimrud, and Ministry of Works sites.

A scale-model of Milazzese, in the island of Panarea (Aeolian Islands), was made for the Department of Prehistoric European Archaeology.

An exhibition on Pigments through the Ages was arranged by the second-year students under the supervision of Mr. S. Rees-Jones.

Miss S. N. Shaw continued her work on the restoration of the wall-plaster from Verulamium and the resultant wall was shown at the Society for the Promotion of Roman Studies' jubilee exhibition of Roman Art at the Goldsmiths' Hall.

The Department's thanks are due to Dr. A. E. Werner, Keeper of the Research Laboratory of the British Museum, for continuing to act as external examiner for the written examination in conservation and for the help that he and his Department are always ready to give. Thanks are also due to Mr. S. Rees-Jones of the Courtauld Institute for instructing the second-year students in the rudiments of the care of paintings and to Mr. A. Rixon of the British Museum (Natural History) for his kindness in demonstrating the use of modern materials used in casting to the Department's new Technician, Mr. Adam Marshall, who will join the staff of the Department in place of Mr. S. G. Rees-Jones, appointed technical assistant in the Department of Archaeology at the Queen's University, Belfast.

Publications

By Mr. Hodges

'Moulds of the Bronze Age from the British Isles, Part II,' Sibrium 5 (1960), pp. 153-162.

LIBRARY

Librarian: Miss J. du Plat Taylor, F.S.A.

Assistant Librarian: Miss G. Talbot, M.A., A.L.A.

Collections Clerk: Miss J. Philips, B.A.

The Library was more frequently used than previously by students and other readers, a fact which is reflected in the slightly lower number of books lent. At least twenty-five visiting scholars made use of the Library.

The principal gift to the Library was the valuable collection of Egyptian lantern slides from Dr. M. A. Murray; these are being incorporated into the collection. The lending of lantern slides to Members was discontinued this year because of the pressure of internal demand on the collection by the teaching staff.

During the vacation the Librarian and Assistant Librarian took part in the Motya, Sicily, excavations.

The following is a summary of the additions made during the year:-

Books		329	Pamphlets		264
Exchanged	65		Exchanged	15	
Presented	126		Presented	213	
Purchased	138		Purchased	36	
Periodicals		255	Lantern slides		539
Volumes bound		237			

Volumes lent totalled 3616, the highest month being November (508), the lowest August (104). 49 works were borrowed from outside libraries and 19 lent. The following have presented books, periodicals, pamphlets and slides:

Algiers, Direction de l'Intérieur et de Beaux Arts; D. F. Allen; Mrs. R. Amiran; E. Anati; Society of Antiquaries of London; H. E. J. Biggs; R. J. Braidwood; British School at Athens; J. J. Butler; Dr. F. Celoria; Chicago University, Oriental Institute; Mrs. P. Christie; CIBA Review; Dr. J. D. Clark; Professor K. de B. Codrington; H. Dunscombe Colt; Dr. I. W. Cornwall; West Cornwall Field Club; Mrs. M. A. Cotton; Mr. J. D. Cowen: Dr. A. H. Dani; Editor of Discovery; Dundee Museum; J. M. Eisenberg; Ethiopian Embassy in London; W. A. Evans; G. E. Fay; Dr. Per Fett; Dr. Henry Field; Dr. H. J. Franken; S. S. Frere; Mrs. Gibbs-Smith; M. Gigout; Goldsmiths' Librarian, University of London; Professor W. F. Grimes; Dr. E. T. Hall; Dr. D. B. Harden; Dr. H. Helbaek; H. W. M. Hodges; J. Hülscher; Idaho State College Museum; Institute of Classical Studies; A. D. Lacaille; Dr. D. M. Lang; Langley London Ltd.; C. M. Lerici; F. D. McCarthy; F. Mallia; T. G. Manby; R. J. Mason; J. V. S. Megaw; M. R. Maitland Muller; Dr. M. A. Murray; Miss T. M. I. Newbould; Dr. A. Nunez Jimenez; A. D. Passmore; Miss J. T. Philips: M. Rivere de la Calle: Miss D. M. Rennie: Dr. G. Roux: Miss N. K. Sandars; School of Oriental & African Studies; Science Museum Library; Borough of Southwark Central Library; M. Stekelis; Dr. T. Sulimirski; R. Summers; Earl Swanson, Jr.; Miss G. C. Talbot; Miss J. du Plat Taylor; Mrs. C. Topp; Miss O. Tufnell: Miss M. Varese: Winchester Museum.

UNIVERSITY OF LONDON

INSTITUTE OF ARCHAEOLOGY

Nineteenth .

ANNUAL REPORT

1 August 1961 — 31 July 1962

COMMITTEE OF MANAGEMENT

THE VICE-CHANCELLOR (Dr. P. S. Noble)

THE CHAIRMAN OF CONVOCATION (Dr. C. F. Harris)

THE PRINCIPAL (Sir Douglas Logan)

The Director of the Institute (Professor W. F. Grimes)

The Director of the Courtauld Institute of Art (Professor Sir A. Blunt)

The Director of the Institute of Classical Studies (Professor E. G. Turner)

The Director of the Warburg Institute (Professor E. H. J. Gombrich)

The President of the Council for British Archaeology (or other representative) (Dr. D. B. Harden)

The President of the Prehistoric Society (or other representative) (Mr. J. D. Cowen)

The President of the Society of Antiquaries of London (or other representative)
(Sir Mortimer Wheeler)

Recognised or Appointed Teachers in cognate subjects, or Heads of Schools or Institutes in the University:—

Professor K. de B. Codrington

Professor P. E. Corbett Professor W. B. Emery

Professor C. Daryll Forde

Dr. J. F. Lockwood

Professor F. Norman

Professor A. H. Smith

Professor S. W. Wooldridge

Two members of the Academic Staff nominated by the Academic Board:—

Professor J. D. Evans

Mr. S. S. Frere

Five other persons:—

Mr. R. L. S. Bruce-Mitford

Professor J. G. D. Clark

Dr. E. G. M. Fletcher

Professor D. McKie One vacancy

Professor Wooldridge again served as Chairman throughout the Session.

THE TWENTY-FIFTH ANNIVERSARY OF THE INSTITUTE

The Institute celebrated the twenty-fifth year of its effective existence in 1962: the formal opening of its first building, St. John's Lodge, Regents Park, was performed by the Earl of Athlone, K.G., Chancellor of the University, on April 29th, 1937.

The occasion was commemorated socially early in the Summer Term. A more permanent memorial, in the form of an enlarged issue of the *Bulletin* to which all members of the present teaching staff have contributed will appear in 1963.

ADMINISTRATION

Director: Professor W. F. Grimes, C.B.E., D.Litt., F.S.A., F.M.A. (A.T.)*

Secretary and Registrar: E. Pyddoke, F.S.A.

Director's Secretary: Miss M. J. Hurrell, B.A.

Mrs. M. Hunt (from May, 1962)

Senior Clerks: Miss M. F. Varese

Mrs. M. Hunt

Miss H. I. Fuller (from July, 1962)

Clerks: Miss J. A. Charlesworth

Miss M. Exton

Staff matters

The Director continued to serve as Chairman of the British Association Research Committee on Ancient Fields, the Council for British Archaeology Committee for Industrial Archaeology, and the London Topographical Society and as Vice-President of the Council for British Archaeology and of the Society for Medieval Archaeology. He was appointed Chairman of the Management Committee of the Field Studies Council.

He attended on behalf of the University the VIth International Congress of Prehistoric and Protohistoric Sciences in Rome.

At the invitation of the Governments of India and of Australia Professor Zeuner visited those countries during December and January to study a number of sites and museum collections.

Dr. Cornwall continued to serve on the British Association Committee to investigate the denudation and burial of archaeological structures and both he and Dr. Waechter delivered lectures at the British Association meeting at Norwich in September 1961.

Professor Evans and Dr. Hodson attended as representatives of the Institute the VIth International Congress of Prehistoric and Protohistoric Sciences in Rome, to which they both made communications. Dr. Hodson also took part in the Ogham Congress on Iron Age Problems at Chateaumeillant in July.

^{*} A.T. Appointed Teacher, R.T. Recognised Teacher, of the University of London, throughout.

Dr. Sulimirski travelled for study purposes in Poland and Russia in the Spring, visiting Warsaw, Brest, Kiev, Virnitsa and Lwow.

Professor Mallowan visited India and Iran and gave lectures at various centres in those countries.

Professor Mallowan and Dr. Kenyon both resigned from the Western Asiatic Department at the end of the Session (see below). Professor Mallowan's successor was not appointed within the period of this Report. Mr. P. J. Parr, M.A. (Oxon), Secretary of the British School of Archaeology in Jerusalem, was appointed to take Dr. Kenyon's place.

Mr. Frere was appointed a Vice-President of the Society of Antiquaries of London.

Miss Gedye lectured in the course for overseas conservators on the scientific examination and conservation of works of art which was sponsored by the British Council in July. Mr. Hodges lectured to the Museums Association on Conservation. He has been appointed Secretary of Section H of the British Association.

Professor M. E. L. Mallowan

Professor Mallowan resigned at the end of the session to become a Research Fellow of All Souls, Oxford. Professor Mallowan had held the Chair of Western Asiatic Archaeology since its establishment in 1947. Under his guidance the Department acquired an international reputation and its former students are widely distributed in positions of authority in the various archaeological services of the Near East. As Director of the British School of Archaeology in Iraq Professor Mallowan was responsible for a number of important excavations at Nimrud and elsewhere.

Dr. K. M. Kenvon

The resignation of Dr. Kenyon to become Principal of St. Hugh's College, Oxford, also at the end of the Session, severed a connection with the Institute which dates back to its earliest days. Dr. Kenyon was associated with Dr. (as he then was) R. E. M. Wheeler and the late Mrs. T. V. Wheeler in the foundation of the Institute in 1932. She became Secretary in succession to Mrs. Wheeler in 1936. During the Second World War Dr. Kenyon was Acting Director and it was very much owing to her efforts that the Institute came through this period relatively unimpaired. In 1948 Dr. Kenyon was appointed Lecturer in Palestinian Archaeology. Since that time, as Director of the British School of Archaeology in Jerusalem, she has added distinguished achievements in Palestinian Archaeology to those already recorded in the Iron Age and Roman periods of British Archaeology.

Visiting Scholars

Dr. E. Anati (Hebrew University), Professor J. A. Calloway (Southern Baptist Theological Seminary, Louisville), Professor L. E. Toombs (Drew University), Miss

J. Bloomgarden (Elmira College, New York), Mr. D. J. Mulvaney (Melbourne University), Mr. H. Sassoon (Jos Museum, Nigeria) and Dr. W. Chmielewski (Department of Archaeology of Poland) worked in the Institute for varying periods during the session.

Public Lectures and Exhibitions

A total of 19 public lectures was given during the session.

Mr. W. A. Eden delivered a lecture, attended by 107 people, entitled 'Historic Buildings in the Modern Scene', to inaugurate the course on the Conservation of Historical Monuments in the autumn term. During the spring term Professor C. J. Becker delivered two Special University Lectures on 'Problems of the Neolithic Period in Denmark'. Attendances averaged 112.

As in previous years a series of general lectures on a wide variety of subjects was arranged, including a course on 'The Native Element in Roman Britain' given in the autumn term. Audiences averaged 57 and the lecturers included Dr. St. Joseph (Curator in Air Photography, Cambridge University), Mrs. M. A. Cotton, Mr. A. H. A. Hogg (Royal Commission on Ancient Monuments (Wales and Monmouthshire)) Dr. E. Anati (Hebrew University, Jerusalem), Mr. G. Jobey (Durham University), Dr. J. Raftery (National Museum of Ireland), Professor Amalgro (University of Madrid), Mr. J. Woods (Imperial College of Science), Mr. F. W. Feachem (Royal Commission on Ancient and Historical Monuments (Scotland)), Miss Diana Kirkbride, Mr. A. E. P. Collins (Survey of Ancient Monuments of Northern Ireland), Mr. James Mellaart (University of Istanbul), Dr. B. S. J. Isserlin (University of Leeds), Mr. G. de G. Sieveking (British Museum) and Professor R. J. Riis (Copenhagen University).

In connection with the Prehistoric Society's Easter Conference an exhibition was held illustrating 'Neolithic Earthworks in Britain'.

The Institute continued to co-operate with the Extra-Mural Department in teaching for the University Extension Diploma in Archaeology. Several of the courses were held in the building and were given by Miss J. M. Sheldon and by past and present students, Dr. Seton Williams, Mrs. Christie and Mr. Robertson Mackay. The Director again acted as External Examiner.

Students

The total number of students registered at the Institute during the session was 116: besides these 73 Intercollegiate students attended courses. Of those at the Institute 24 were registered for Diplomas, 33 for Higher Degrees, 11 for special research under Statute 21 (iii)—6 full-time and 5 part-time—13 as full-time Technical students and 5 for the Course on the Conservation of Historical Monuments: 22

Occasional students have been attending lectures and using the facilities of the Institute and 8 students have attended courses as full-time Occasional students.

Two students were awarded the Diploma in European Archaeology (Section A: Prehistoric Europe), three the Diploma in European Archaeology (Section B1: Iron Age and Roman Provinces), one with Distinction, and one the Diploma in Prehistoric Archaeology.

Of the 33 Higher Degree students 13 were registered for the Ph.D. full-time (4 in the Faculty of Science), and 7 part-time (1 in the Faculty of Science): 8 were registered for the M.A. full-time and 5 part-time. Of the foregoing, in November 1961 Mr. A. H. Mirza was awarded the Ph.D. degree for his thesis on 'Mughal Jades and Crystals, based on a catalogue raisonné of the collections in the national museums of London', Miss A. Birchall in May 1962 for her thesis on the 'Origins of The Aylesford-Swarling culture', Miss J. Clutton Brock in March 1962 for her thesis on 'An analysis of mammalian faunas from prehistoric sites in India and Western Asia', and Miss C. Epstein in March 1962 for her thesis on 'The origins and development of Bi-chrome Ware in Palestine'. In June 1962 Mr. F. A. Durrani was awarded the degree of M.A. for his thesis on 'Selected Archaeological Materials from Harappan Sites and their Mesopotamian Correlations', Miss E. A. Dowding in June 1962 for her thesis on 'Prehistoric plant fibre materials from the Canary Islands' and Miss J. Alcock in July 1962 for her thesis on 'Celtic religion in Roman Britain', the last with a mark of Distinction.

Six Conservation students qualified for the Institute's internal Certificate for Conservation and Technology.

The following overseas countries were represented among students registered at the Institute: Australia, 4; Belgium, 1; Ceylon, 1; Denmark, 2; France, 1; India, 3; Iraq, 2; Israel, 2; Jordan, 1; Libya, 1; Malta, 3; Nigeria, 2; Pakistan, 1; Poland, 1: Portugal, 2; S. Rhodesia, 2; Sweden, 1; U.S.A., 10.

Teaching Collections

The following additions were made during the session:

- (a) from Mr. D. J. Stronach: stratified series of Iron Age and earlier material from Yarim Tepe, Iran.
- (b) from Mr. C. Burney: stratified collection of Early Bronze Age sherds from Yanik Tepe, Azerbaijan.

Both donations fill important gaps in the teaching collections of the Western Asiatic Department. They are the outcome of grants to the excavators from the Gordon Childe Bequest.

In addition Mr. Stronach has given the Institute an important collection of pre-

historic painted potsherds from the site of Tell Amiyak in Iraq. This pottery, belonging to the 'Ubaid series known as Q. Hajj Mohammed ware, was not previously represented in the Mesopotamian collections.

Gifts

Miss Elizabeth Cartwright presented a binocular microscope to the Conservation Department.

Gordon Childe Prize and Memorial Fund

The Gordon Childe Prize for 1961/62 was divided between Mr. Jorge Alarcao, who, having previously followed the Conservation Course, was successful in the June examination for the Academic Post-graduate Diploma in the Archaeology of the Roman Provinces, and Miss M. McGregor who was awarded the Institute's Certificate of Conservation.

A grant from the Memorial Fund was made to Dr. Sulimirski to enable him to continue his studies on the Neolithic and Bronze Ages of Eastern Europe. No other grants were made this year.

Margary Fund

Mr. I. D. Margary, F.S.A. made a generous gift of £5,000 to the Institute for such purposes as the Committee of Management might decide. The income from the fund will be used primarily to assist students of the Institute with grants for travelling, decisions as to awards being left with Heads of Departments in consultation with the Director. The Institute's grateful thanks are offered to Mr. Margary for this benefaction, which for the first time makes it possible to meet a need which has been felt on a number of occasions in the past.

TEACHING AND RESEARCH

Institute Field Course

The Field Course was held over a period of three weeks at the end of the summer term, and once again thanks are due to Messrs. Felix Fenston and R. Turpin for the use of Druid's Lodge as a centre.

This year a new policy was adopted and work was centred on Stockton Earthworks, a site of several periods near Wylye in Wiltshire. The site displays interesting surface features which provide useful exercises in survey and interpretation. A policy of limited excavation has been embarked on, one purpose of which will be to apply detailed tests in the use of various prospecting devices. This work is being done in collaboration with Dr. M. J. Aitken of the Oxford University Research Laboratory for Archaeology and the History of Art and with Mr. Anthony Clark of the Distillers'

Company Laboratory; and for it the Institute has purchased its own resistivity meter and proton-gradiometer ('bleeper'). It is hoped to work on the site over a period of several years and the Institute's gratitude goes to the owners of the area, Mr. Nicholas Yeatman-Biggs, and Mr. Michael Stratton and to Mr. Frank Sykes for the generous and kindly help which they have provided in a number of different ways. The Director, Professor Evans and Dr. Hodson were mainly responsible for the archaeological side of the course, with Mr. Stewart in charge of surveying and Mr. Cookson of photography. Dr. Cornwall dealt with environmental matters and Mr. Frere also visited for a few days. Mr. Pyddoke and Mr. Cookson were responsible for the general administration.

This year's work was devoted mainly to a preliminary proton-magnetometer survey of a large part of the area within the defences of the site, some of the anomalies recorded by the machine being then tested by excavation. The pits and other features so revealed were found to be mainly of late Iron Age and Roman date. In addition a beginning was made with the detailed surveying of the site.

The Institute again participated in an expedition with Leeds University under the joint leadership of Dr. B. S. J. Isserlin and Miss du Plat Taylor to undertake excavations in the Phoenician settlement at Motya. Miss Talbot participated in the work and Mr. Cookson again was responsible for the photography.

Research Seminar in Archaeology and related subjects

In the early part of the session a proposal was made for the establishment of a research seminar the broad purpose of which should be to draw together research workers and others interested in archaeological and anthropological studies for the discussion of common problems and the general interchange of ideas. The proposal received widespread support and the membership of the seminar soon topped the 100 mark and covered a very wide range of specialists: ancient historians, social and physical anthropologists, and so on, in addition to archaeologists. The success of the seminar in its formative stages owes a great deal to the energies of Mr. P. J. Ucko, who is a student of the Institute and of University College jointly. The Institute has been glad to provide the necessary meeting-room and other facilities, including tea before meetings and has undertaken to duplicate and distribute the necessary papers. Three meetings were held during the session, the subjects dealt with relating. to prehistoric religion, African archaeology and Pleistocene archaeology, with an attendance of more than 40 in each case. There can be no doubt that the seminar meets a real need and as a result of recent discussions a committee has been set up to administer it. In the 1962-63 session it is proposed to hold meetings alternately at the Institute of Archaeology and the Royal Anthropological Institute in Bedford Sauare.

THE DEPARTMENTS

The Director's general introductory course on archaeology was attended by 27 Intercollegiate students. He continued to direct the excavations in London, where he has been concerned with areas in Thames Street and the Church of St. Alban, Wood Street, in the City, and with part of the site of Bermondsey Abbey on the south side of the river.

Publications:

By the Director (with A. D. Lacaille):

'The Prehistory of Caldey, Pembrókeshire', Part 2, Archaeologia Cambrensis, 1961, pp. 30-70.

Various articles in Encyclopaedia Britannica.

By Mr. Pyddoke:

Stratification for the Archaeologist, 124 pp., Phoenix Press, 1961.

ENVIRONMENTAL ARCHAEOLOGY

Professor: F. E. Zeuner, Ph.D., D.Sc., F.S.A. (A.T.)

Lecturers: I. W. Cornwall, Ph.D. (R.T.)

J. d'A. Waechter, Ph.D., F.S.A. (R.T.)

Assistant: Miss J. M. Sheldon
Honorary Assistant: Mrs. R. Barton

The number of students working in the Department during the year was 16, 6 being registered for the Ph.D., 3 for the M.A., 1 for the Postgraduate Diploma in Prehistoric Archaeology and 6 as Research students under Statute 21 (iii). Of the Higher Degree students, 5 were registered in the Faculty of Science and 4 in the Faculty of Arts. These students worked on the following subjects during the session:

Ph.D.

- R. W. Andrews (Faculty of Science (part-time)): British varved clays.
- C. Banks, Mrs. (née Grigson) (Faculty of Science): Prehistoric cattle.
- J. Clutton-Brock (Mrs. Jewell) (Faculty of Science): Faunas from prehistoric sites in India, Arabia and the Mediterranean.
- G. W. P. Jarvis (Faculty of Arts (part-time)): The relative chronology of the Lea Valley.
- G. Naylor (Faculty of Science): Palaeoclimatology.
- A. C. Patel (Faculty of Science): The correlation of loess sites in Europe.

M.A.

D. Biernoff (Faculty of Arts): Faunas from prehistoric sites in the Middle East.

- E. A. Dowding, Miss (Faculty of Arts): Prehistoric fibre materials from the Canary Islands.
- D. Mathewson (Faculty of Arts): Weathering processes on archaeological objects.

Statute 21 (iii)

- R. Bryan, Mrs. and A. Bryan, Mr.: Environmental Archaeology in the Southend region.
- M. Collins, Miss: Macroscopic plant remains.
- A. Knowles, Mrs. (née Grosvenor-Ellis): Fauna of Neolithic Jericho.
- A. C. Western, Miss (part-time): Identification of wood from archaeological sites.
- B. Westley, Mrs. (part-time): Faunas from archaeological sites.
- P. E. N. Tindall, Mrs.: Lower Palaeolithic industries in Africa.

Of the Higher Degree students, Miss Clutton-Brock was awarded the Ph.D. in March 1962 and Miss Dowding in June 1962. Mr. P. Garlake, who made a special study of prehistoric stone artefacts from the Canary Islands, was successful at the Diploma examinations in June 1962.

During his visits to India and Australia Professor Zeuner studied sites and museum collections. Professor Zeuner carried out field work in particular on the possibility of establishing a long-distance sea-level correlation of prehistoric Australia with Europe, by request of the Australian Academy of Sciences, and on the relation between loess sequences and sea-level fluctuations in Sujaret by request of Baroda University. The work in Sujaret is providing the first possibility of dating the Indian Acheulian in terms of the European chronology.

Dr. Cornwall visited a number of excavations in this country at the request of the excavators in order to study soil problems. In addition, several applications to study archaeological materials, soils or bones were accepted during the year, involving about 140 samples. The sites included Stonewall Shelter, Kent (Neolithic), Willerby Wold. Yorks (Neolithic Long Barrow), Salisbury Plain (Bronze Age), Poltalloch, Argyll (Iron Age-Dark Ages), Weston Wood, Surrey (Bronze Age) and a soil problem from the Mio-Pliocene of Kenya.

Mrs. B. Westley, Messrs. G. H. Bunting and D. W. Verity identified numerous animal and human bones from archaeological sites and wrote reports for the excavators. Miss P. Wallace continued the study of tree-rings in logs from Roman and later sites in Britain, and from prehistoric sites in Gran Canaria.

Publications

By Professor Zeuner:

'A Subfossil Giant Dermapteron from St. Helena', *Proc. Zool. Lond.* Vol. 138, Part 4, 1962, pp. 651-653.

- 'Criteria for the Determination of Mean Sea-Level for Pleistocenc Shore-Line Features', Quaternaria V, 1962, pp. 143-147.
- 'Faunal Evidence for Pleistocene Climates', Annals of the New York Academy of Sciences, Vol. 95, 1961, pp. 502-507.
- 'The Sequence of Terraces of the Lower Thames and the Radiation Chronology', Annals of The New York Academy of Sciences, Vol. 95, 1961, pp. 377-380.
- 'Archaeology and the Problem of Food Production in North Africa', University of London Meeting of Convocation, 1961, pp. 22-23.

 (With A. J. Sutcliffe)
- 'Excavations in the Torbryan Caves, Devonshire', Proc. of the Devon Archaeological Exploration Society, Vol. V, 961 pp. 127-145.

By Dr. Cornwall:

- Reports on 'Faunal remains from Post-Pleistocene layers, Daylight Rock Fissure' and on 'Soil Samples from Daylight Rock Fissure' in Lacaille and Grimes, 'Prehistory of Caldey', *Archaeologia Cambrensis*, 1961, pp. 66-70.
- 'Report on the Soil Samples' in de Mallet Vatcher 'Thornborough Cursus, Yorks', Yorkshire Archaeological Journal, CLVIII, 1960, pp. 180/1.
- 'Report on the Cremations' and 'Soil Samples from the Druids' Circle' in Griffiths 'The Excavation of Stone Circles near Penmaenmawr, North Wales', *Proc. Prehistoric Society*, Vol. XXVI, 1960, pp. 335-338.
- 'Soil Investigation—Summary of Results' in Grant King, 'Bury Wood Camp, Report on Excavations, 1959', Wilts. Arch. and Nat. History Magazine, Vol. LVIII, 1961, p. 46.
- 'Human, Animal, Bird and Fish Bones' in M. Aylwin Cotton and G. C. Dunning, 'The Norman Bank of Colchester Castle and Saxon and Norman Pottery from Colchester Castle Park', *Antiquaries Journal*, Vol. XLII, 1962, pp. 60/61. (With G. J. Wainwright)
- 'Samples from the Long Mortuary Enclosure, Normanton Down' in de Mallet Vatcher 'The Excavation of the Long Mortuary Enclosure on Normanton Down', *Proc. of the Prehistoric Society*, Vol. XXVII, 1961, pp. 171/173.

INDIAN ARCHAEOLOGY

Professor: K. de B. Codrington, M.A. (A.T.)

Four students were registered for higher degrees as follows:

Ph.D.

- A. H. Mirza (Faculty of Arts): Arts and Crafts of the Mughal Courts.
- H. A. Ratnayake (Faculty of Arts): Arts and Crafts of Ceylon. (The supervision of the work of these students was shared with Mr. H. W. M. Hodges).

K. K. Sinha (Faculty of Arts): on the subject of contacts between the Indo-Pakistan Sub-Continent and Western Asia during the First Millennium B.C.

M.A.

I. A. R. Naik, Miss (Faculty of Arts): The Culture of the Nilgiri Graves.

Mr. Mirza was awarded the Ph.D. degree in November, 1961.

Mr. Ratnayake returned to Ceylon to complete his researches and brought back interesting new material. Students from outside the Institute continue to seek instruction on various aspects of Indian Archaeology. The proposed reorganisation of the teaching of the History of Indian Art will it is hoped bring about a closer collaboration between the teachers concerned, especially with regard to visits to the National Museums, which continue to be popular. Field expeditions were made to Canterbury, St. Albans and the Weald of Kent. There has been a marked increase in applications for registration for higher degrees.

PREHISTORIC EUROPEAN ARCHAEOLOGY

Professor: J. D. Evans, M.A., Ph.D., F.S.A. (A.T.)

Lecturer: F. R. Hodson, M.A., Ph.D.

Special Lecturer in Central and East European Archaeology: T. Sulimirski, Iur.D., Ph.D. (Lwow), Hon. F.S.A.

Twelve students were registered as full-time candidates for the Postgraduate Diploma; of these, 4 were in their second year and 1 in his third year. There was also 1 part-time student in his third year. These 6 were due to sit the Diploma examination in June, but one of the second year students withdrew at the last moment, having decided to take a third year before sitting. Of the remaining 5 who took the examination only 2, Mr. J. L. W. Williams and Miss E. Bell were successful.

There were seven students registered for Higher Degrees, as follows: Ph. D.

- D. Britton (Faculty of Arts (part-time)): Some aspects of the metal industry in Prehistoric Europe, especially in Britain.
- P. J. Ucko (Faculty of Arts): The Prehistoric Anthropomorphic Figurines of the Ancient Near East and the Aegean.
- S. Mann, Miss (Faculty of Arts (part-time)): The Neolithic Cultures of S. Italy.
- R. R. Mackay (Faculty of Arts (part-time)) (re-registration): Aspects of the British Neolithic.
- H. Roberts, Mrs. (Faculty of Arts): An inquiry into some styles of decoration in repoussé on objects of sheet bronze from early Etruscan tombs.

M.A.

E. Coult, Mrs. (Faculty of Arts): Posti-Palaeolithic Stone Industries of Great Britain.

E. Pike, Mrs. (Faculty of Arts): Land transport in the Western Mediterranean in pre-Roman times.

Professor Evans spent 2 months (April/May) in Greece working on the finds from the Knossos excavations and collecting comparative material.

Publications

By Professor Evans:

'The Earliest Settlement at Knossos', *Illustrated London News*, Sept. 2nd, 1961, pp. 366-367.

By Dr. Hodson:

Various reviews.

By Dr. Sulimirski:

'A Pit-Dwelling of the Danubian I Culture and Barrow-Graves at Rzeplin District of Jaroslaw' (In Polish with an English Summary), *Acta Archaeologica Carpathica* II Cracow 1960, pp. 123-130.

'Die Skythen in Mittel- und Westeuropa', Bericht uber den V. Intern. Kongress f. Vorund Fruhgeschichte, Hamburg 1958, Berlin 1961, pp. 793-799. Various reviews.

ARCHAEOLOGY OF THE ROMAN PROVINCES

Reader: S. S. Frere, M.A., V-P.S.A. (A.T.)

There were 10 students working in the Department, 4 of whom were registered for the Postgraduate Diploma.

Ph.D.

A. Birchall, Miss (Faculty of Arts): The Aylesford-Swarling culture.

W. Manning (Faculty of Arts): Objects of Iron in Roman Britain.

M.A.

J. P. Alcock, Miss (Faculty of Arts): The Celtic Cults of Roman Britain.

H. F. Cleere (Faculty of Arts): The Iron Industry of Roman Britain.

K. S. Painter (Faculty of Arts): Roman Glass.

During the year the Ph.D. degree was awarded to Miss Birchall, and the M.A. (with Distinction) to Miss Alcock. Miss E. Dowman, Mr. M. Goodliffe and Mr. J. Alarcao were successful in the Diploma examination and Mr. Goodliffe achieved Distinction.

Regular courses of lectures have been given on Roman Britain and on the Western Empire; the former were attended by a total of 19 inter-collegiate students.

In addition to a number of outside lectures, the Reader gave a course of 8 extra-mural lectures at Purley.

Work was continued within the Department on the restoration of Roman wall plaster from Verulamium and the Bignor Villa; on the card index of Celtic coins; and on the card index of Romano-British art and objects.

The Reader directed excavations at the Roman fort at Trawscoed near Aberystwyth with Dr. J. K. St. Joseph for two weeks in April. He worked for five weeks in July-August at Dorchester-on-Thames.

Publications

By Mr. Frere:

'Some Romano-British Sculpture from Ancaster and Wilsford, Lines.' *Antiquaries Journal* XLI, pp. 229-231.

'Enceintes de l'Age du Fer au pays des Lemovices' (with Mrs. M. A. Cotton), *Gallia* XIX, pp. 31-54.

Mr. Frere also edited Surrey Archaeological Collections Vol. LVIII, M. R. Hull, Roman Colchester II, M. Callender, Corpus of Amphora Stamps.

WESTERN ASIATIC ARCHAEOLOGY

Professor: M. E. L. Mallowan, C.B.E., M.A., D.Lit., F.B.A., F.S.A. (A.T.)

Lecturer in Palestinian Archaeology: Miss K. M. Kenyon, C.B.E., M.A., D.Lit.,

F.B.A., F.S.A. (R.T.)

Lecturer: Miss Barbara Parker, O.B.E., F.S.A.

Special Tuition: Mrs. K. R. Maxwell-Hyslop, F.S.A. (R.T.)

The number of full-time students in the Department was 16 of whom 7 were studying Mesopotamian Archaeology, 1 Iranian and 8 Palestinian, including three full-time occasional students. Three students were reading for the Diploma in Mesopotamian Archaeology, for the Diploma in Iranian Archaeology and 2 for the Diploma in Palestinian Archaeology.

Students were registered for higher degrees as follows:

Western Asiatic

Ph.D.

H. Browne, Miss (Mrs. Crawford) (Faculty of Arts): The Archaeology of the Early Dynastic Period.

M.A.

Abdul Qadr Hassan Al-Tikriti (Faculty of Arts): Neolithic and Pre-Halaf Periods of Mesopotamian Archaeology.

F. A. Durrani (Faculty of Arts): Connection between the Indus Valley and Mesopotamia.

T. A. L. W. Madhloom (Faculty of Arts): The chronological development of Neo-Assyrian Art.

Palestinian

Ph.D.

- F. James, Mrs. (Faculty of Arts): Bethshan in the Late Bronze Ages and Early Iron Age.
- C. Epstein, Miss (Faculty of Arts): The Bi-chrome Pottery of Palestine in the Late Bronze Age and its connections.

M.A.

R. Dajani (Faculty of Arts): The culture of eastern Jordan in the Iron Age.

Of the higher degree students Mr. Durrani was awarded the M.A. in June and Miss Epstein the Ph.D. degree in March.

A class of 25 students attended the course in the Rise of Civilisation in the Near East, and 20 students attended the course on Syria and Assyria. A class of 30 students attended the first year course on Palestinian Archaeology and 10 the second year course.

Tutorials were given for students at the School of Oriental and African Studies studying the Akkadian and Iranian languages.

Diploma students for the Palestinian Diploma attended a course in Hebrew at University College and all 3 candidates successfully passed their preliminary tests.

The Department continued its research activities. Dr. Kenyon directed the second campaign of excavations in Jerusalem of the British School of Archaeology in Jerusalem from May to August. The excavations continue to elucidate the history of Jerusalem.

Publications

By Professor Mallowan:

Various reviews.

By Mrs. Maxwell Hyslop:

Various reviews.

By Miss Barbara Parker:

'Seals and Seal Impressions on Ivories from Nimrud Excavations, 1955-58', *Iraq*, XXIV, Part 1, 1962, pp. 26-40.

DRAWING AND SURVEYING

Lecturer: H. M. Stewart, B.A.

The numbers of students attending courses were:

Drawing: 34 (13 Diploma, 12 Conservation, 2 Higher Degree, 7 Occasional);

Surveying: 23 (12 Diploma, 5 Conservation, 2 Higher Degree, 4 Occasional).

Services provided to members and staff of Institute and to other bodies included the inking in of plates for the Egypt Exploration Society's Archaeological Surveys.

In the annual Field Course work was begun by students on the surveying of Stockton Earthwork, Wiltshire, a project which will be continued over the next few years.

PHOTOGRAPHY

Lecturer: M. B. Cookson Assistant: Mrs. M. V. Conlon

There were 20 students in the Department (13 Diploma, 7 Conservation). In addition 4 students were trained for photographic work, 1 in University College London (Anthropology), 1 in Classical Archaeology at Cambridge and 2 for posts overseas.

In other respects the activities of the Department, production of lantern-slides etc., were maintained as in recent years. The use of the students' darkrooms continued to increase.

The help of the department continues to be sought in matters to do with photographic laboratories and parties from America (3), Norway, Denmark, Sweden, Bonn University, India and Pakistan (one each) and Australia (2) have visited the laboratory, as also did several English parties.

The department lent a number of enlargements to Leeds University for use in an exhibition of archaeological photography there.

The Lecturer was again responsible for the photography for the Motya (Sicily) excavation. Much work was also done for the indexes being compiled by the Reader in the Archaeology of the Roman Provinces.

The following new photographic equipment was acquired: 3 tripods, a large copying camera by Gandolphi together with a process lens; and a motor for the glazing machine.

Publications

By Mr. Cookson:

'Illustrated by Colour Slides', Archaeological News Letter, 7, 1962, p. 139.

CONSERVATION

Lecturer-in-Charge: Miss Ione Gedye, B.A., F.I.I.C.

Lecturer: H. W. M. Hodges, F.I.I.C. (R.T.)

Technicians: Miss S. N. Shaw

A. Marshall

Twenty-six internal students worked in the Department of whom 13 followed the Conservation course, 5 being in their second year. The remaining 13 were Diploma

and Higher Degree students. In addition a Museum Assistant from the British Museum attended part of the second year course.

As in previous years work of instructional value to students was undertaken for a number of museums and excavations. Amongst the museums were Alton (Curtis Museum), Aylesbury, Corinium Museum, Coventry, Canterbury, Dartford, Lincoln and Lewes. Excavations were represented by Canterbury, Verulamium, Nimrud, and Ministry of Works' sites.

Miss S. N. Shaw continued her work on the restoration of wall-plaster from Verulamium.

The Department's thanks are again due to Dr. A. E. Werner, Keeper of the Research Laboratory of the British Museum, both for acting as external examiner and for help in many other ways. Thanks are also due to Mr. S. Rees-Jones of the Courtauld Institute for instructing the second-year students in the rudiments of the care of paintings and the technology of painting materials.

Mrs. A. Alarcao, Mr. J. Alarcao, Miss C. Booth, Miss G. Joysmith, Miss M. McGregor and Miss A. Searight qualified for the Institute's Certificate in Conservation.

CONSERVATION OF HISTORICAL MONUMENTS

Director of Studies and Lecturer:

W. A. Eden, M.A., F.S.A., F.R.I.B.A. (Theory of Architecture. The Law relating to Ancient Monuments and Historic Buildings)

Lecturers: H. M. Colvin, M.A., Hon. A.R.I.B.A. (Documentary Sources for the History of Architecture)

Mrs. M. P. G. Draper, B.A., F.S.A. (Palaeography)

S. E. Dykes Bower, M.A., F.S.A., F.R.I.B.A. (Diagnosis and Treatment of Structural Faults in Buildings)

R. Gilyard-Beer, M.A., F.S.A. (English Architecture, 597-1540)

There were 5 students registered in the Department of whom 3 were candidates for the Postgraduate Diploma in the Conservation of Historical Monuments. One followed the academic side of the course only, and another attended only the course in Palaeography.

A course of three lectures on mediaeval wall paintings and their treatment by Mr. E. Clive Rouse, F.S.A. was arranged in March. In June students spent a day at the Forest Products Research Institute at Princes Risborough examining the effects of various types of rot and infestation and subsequently Mr. J. G. Savory, Mr. J. D. Bletchley and Mr. E. C. Harris of the Forest Products Research Institute, to whom thanks are due for giving freely of their time, gave illustrated lectures at the Institute.

During the session visits were arranged to Denny Abbey, the Trinity Almshouses and St. John of Wapping, Stepney, to Cambridge (two visits) and to Portchester.

The restoration of the Chapel of the Trinity Almshouses, Mile End Road (which received a Civic Trust Award) and the Tower of the Church of St. John of Wapping was completed, under the direction of Mr. Eden, for the London County Council.

Mr. Colvin continued his work on the history of the King's Works.

Mrs. Draper continued her work on the Parish of St. James's, Westminster, for the Survey of London.

Mr. Dykes Bower continued to direct repairs, cleaning and decorative work at Westminster Abbey and also completed the following: the restoration of Great Yarmouth Parish Church and St. Vedast Foster Lane; the restoration of the First and Second Courts and the new Pepys Library, Magdalene College, Cambridge and the redecoration of the Hall at Queens' College, Cambridge.

Publications

By Mr. Eden:

'Rebuilding a Masterpiece', Country Life, March 1962.

By Mr. Colvin:

'Haunt Hill House, Weldon', Studies in Building History, ed. E. M. Jope, 1961, pp. 223-228.

By Mrs. Draper:

'When Marlborough's Duchess Built', Country Life, August 1962.

LIBRARY

Librarian: Miss J. du Plat Taylor, F.S.A.

Assistant Librarian: Miss G. Talbot, M.A., A.L.A.

Collections Clerk: Miss J. Philips, B.A.

Constant and full use of the library was reflected in the amount of time spent by the Librarians in dealing with queries and the internal handling of books.

Valuable help was given by Mr. Eldridge in mounting prints from the Photograph Collection in his spare time.

During the summer vacation, the Librarian acted as Assistant Director to the Motya Excavations, in which the Assistant Librarian also took part.

The following is a summary of the additions made during the year:

Books		280	Pamphlets		177
Exchanged	71		Exchanged	25	
Presented	57		Presented	123	
Purchased	152		Purchased	. 29	

Periodicals 323
Volumes bound 145

415

Volumes lent totalled 3,710, the highest month being October (491), the lowest September (141). 43 works were borrowed from outside libraries and 33 lent.

Lantern slides

The following have presented books, periodicals, pamphlets and slides:

Mrs. R. Amiran; Dr. E. Anati; Society of Antiquaries of London; A. M. ApSimon; A. A. Barb; B. P. Belgium; Professor C. J. Becker; W. Bonser; G. C. Boon; British Academy; British Archaeological Association; Dr. J. J. Butler; CIBA Review; Club Alpin sous-marin; H. M. Colvin; Dr. I. W. Cornwall; West Cornwall Field Club; Mrs. M. A. Cotton; J. D. Cowen; Dr. A. H. Dani; Derbyshire Museum Service; G. Dessau; A. P. Detsicas; Editor of *Discovery*; R. H. Dyson; G. E. Fay; Dr. Per Fett; Dr. Henry Field; H. J. Franken; S. S. Frere; Dr. A. E. Garrod; P. W. Gathercole; Professor W. F. Grimes; Dr. D. B. Harden; Mrs. Sonia Hawkes; Institute of Classical Studies; D. Kaye; Dr. K. M. Kenyon; Miss Koopman; A. D. Lacaille; G. J. D. Little; Goldsmiths' Librarian, University of London; Dr. J. L. Lorenzo; S. C. Malik; J. V. S. Megaw; Dr. M. A. Murray; Musée Royal de l'Afrique Central, Tervuren; C. D. P. Nicholson; Dr. K. P. Oakley; A. do Paço; J. Perrot; Miss J. Philips; E. Pyddoke; Mrs. Ravetz; Dr. M. V. Seton-Williams; Miss M. Small; Society for the Promotion of Roman Studies; South African Archaeological Survey; Professor T. Sulimirski; R. Summers; Miss G. C. Talbot; Z. Tasliklioglu; Miss J. du Plat Taylor; Thames & Hudson Ltd.; Mrs. Theocharis; Miss Olga Tufnell; J. D. Van der Waals; Warburg Institute; Miss A. C. Western; Professor F. E. Zeuner.

STUDENTS' APPOINTMENTS

Mr. J. Alarcao and Mrs. A. Alarcao have been given appointments in the Museo Monografico de Conninbriga, Dondeiza, Portugal.

Miss Ann Birchall was appointed Assistant Keeper in the Department of Greek and Roman Life of the British Museum.

Miss C. Booth has been appointed to a temporary post as Technical Assistant in the British Museum.

Miss Joanna Close Brooks was given a research grant by the British School at Rome and is now working at the School.

Miss E. A. Dowding has been appointed to a post with a commercial map-making company.

Mr. F. A. Durrani returned to his post as Lecturer in Archaeology in the University of Peshawar.

- Miss C. Epstein is organising "Knowledge of the Country" section among the kibbutzim in Israel.
- Mr. P. S. Garlake was awarded a scholarship by the High Commissioner for Rhodesia and Nyasaland and is working at the British Institute of Archaeology in East Africa at Dar Es Salaam.
- Mr. J. M. Goodliffe and Miss E. Bell (now Mrs. Goodliffe) have been given posts at the Instituto Nacional de Antropologia y Historia, Mexico City.
- Miss G. Joysmith has been appointed to a temporary post as secretary and technical assistant to Mr. Rees-Jones at the Courtauld Institute.
- Miss M. E. McGregor was appointed a temporary assistant in the Western Asiatic Department of the British Museum.
- Miss A. Rosenfeld and Mr. J. L. W. Williams have been given temporary posts as assistants in the Environmental Department of the Institute.
 - Miss Ann C. Searight is working on the repair of ivories in Baghdad Museum.
- Mr. P. Ucko is a research assistant in the Department of Anthropology in University College and is giving a course of lectures at the Institute.









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